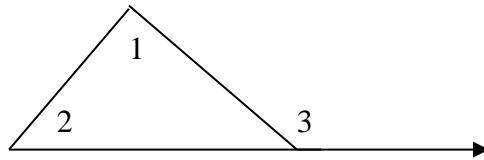
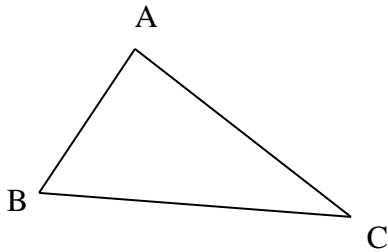


Math 1312
Section 3.5
Inequalities in a Triangle

Lemma: If $\angle 3$ is an exterior angle of a triangle and $\angle 1$ and $\angle 2$ are non-adjacent interior angles, then, $m\angle 3 > m\angle 1$ and $m\angle 3 > m\angle 2$. (The measure of an exterior angle is greater than the measure of either of the nonadjacent angles.)

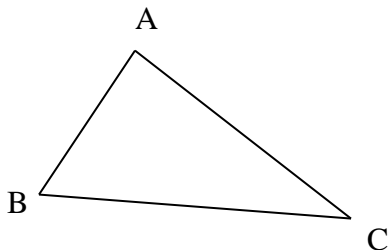


Lemma: If a triangle contains a right or obtuse angle, then that angle's measure is greater than either of the two other angles in the triangle.



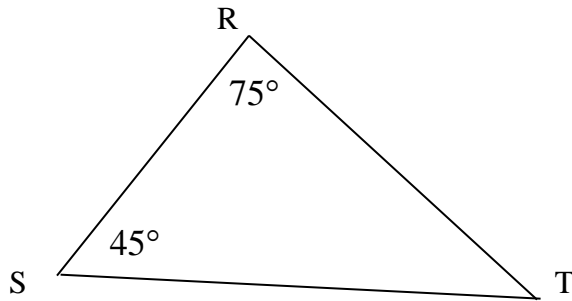
Theorem: If one side of a triangle is longer than a second side then the measure of the angle opposite the longer side is greater than the measure of the angle opposite the shorter side.

Example: Given $\triangle ABC$ with sides of the following lengths $AB = 4$, $AC = 7$ and $BC = 5.5$. Arrange the angles by size.



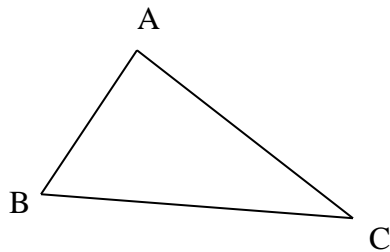
Theorem: If the measure of one angle of a triangle is greater than the measure of a second angle, then the side opposite the larger angle is longer than the side opposite the smaller angle.

Example: Given $\triangle RST$ with angles that have the following measures. Arrange the sides in order of size.



Theorem: (Triangle Inequality) The sum of the lengths of any two sides of a triangle is greater than the length of the third side.

Given: $\triangle ABC$



$$BA + CA > BC$$

Theorem: (Triangle Inequality) The length of any side of a triangle must be between the sum and difference of the other two sides.

Example: Which of the following sets of numbers cannot represent the sides of a triangle?

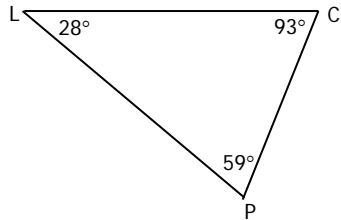
a. 7, 7, 3

b. 4, 5, 1

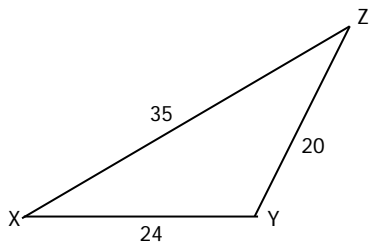
Example: If the lengths of two sides of a triangle are 10 and 15, between what two numbers must the measure of the third side fall?

Example:

A. Arrange sides from smallest to largest .



B. Arrange angles from smallest to largest.



Example:

List the sides of $\triangle ABC$ in order from longest to shortest.

$$m\angle A = 4x + 20$$

$$m\angle B = 2x + 10$$

$$m\angle C = 4x - 20$$