Lesson 4-6

Example 1

CONSTRUCTION A frame must be built to pour a triangular cement slab to complete a walkway. The lengths of two sides of the triangle are 8 feet and 11 feet. Find the range of possible lengths for the third side.

Solution

Use the variable n to represent the length in feet of the third side. By the triangle inequality theorem, these three inequalities must be true.

I. $8 + 11 > n$
$19 > n$

II. $8 + n > 11$
$n > 3$

III. $11 + n > 8$
$n > -3$

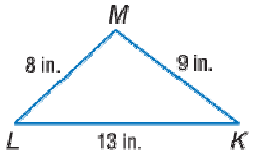
Inequality **III** is not useful, since a length must be a positive number.
From inequalities **I** and **II**, you obtain the combined inequality $19 > n > 3$.
So the length of the third side must be less than 19 ft and greater than 3 ft.

Example 2

In $\triangle KLM$, $KL = 13$ inches, $LM = 8$ inches, and $KM = 9$ inches. List the angles of the triangle in order from largest to smallest.

Solution

Draw and label $\triangle KLM$, as shown at the right.



The angle opposite $\overline{KL}$ is $\angle M$.
The angle opposite $\overline{KM}$ is $\angle L$.

Since $13 > 9$, $KL > KM$.

So, by the unequal side theorem, $m\angle M > m\angle L$.
By similar logic, $m\angle L > m\angle K$.
So, from largest to smallest, the angles are $\angle M$, $\angle L$, and $\angle K$.