Name: _____

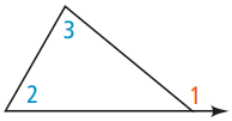
Inequalities in One Triangle
Geometry

take note

Corollary Corollary to the Triangle Exterior Angle Theorem

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

If . . .
$\angle 1$ is an exterior angle



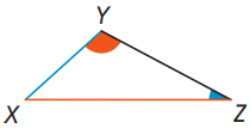
Then . . .
$m\angle 1 > m\angle 2$ and
$m\angle 1 > m\angle 3$

take note

Theorem 5-10

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

If . . .
$XZ > XY$



Then . . .
$m\angle Y > m\angle Z$

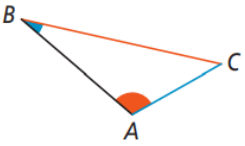
You will prove Theorem 5-10 in Exercise 40.

take note

Theorem 5-11

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

If . . .
$m\angle A > m\angle B$



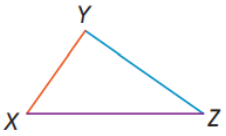
Then . . .
$BC > AC$

take note

Theorem 5-12 Triangle Inequality Theorem

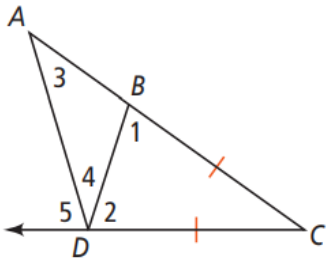
The sum of the lengths of any two sides of a triangle is greater than the length of the third side.

$XY + YZ > XZ$ $\quad YZ + XZ > XY$ $\quad XZ + XY > YZ$

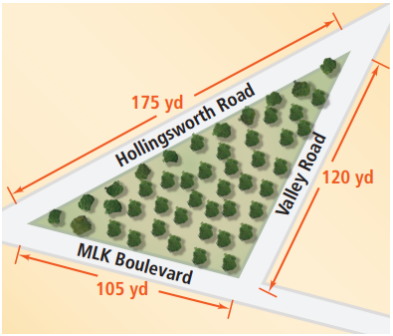


You will prove Theorem 5-12 in Exercise 45.

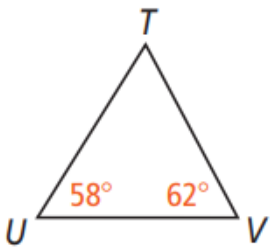
Examples:



Explain why the measure of angle 2 is greater than the measure of angle 3.



A landscape architect wants to place a bench at the corner of this park that has the largest angle. Which two streets form the largest angle?



Place the sides of this triangle in order from smallest to largest.

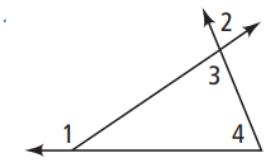
Can a triangle have the following sides?

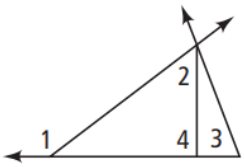
a. 3ft, 7ft, 8ft?
b. 5ft, 10ft, 15ft?

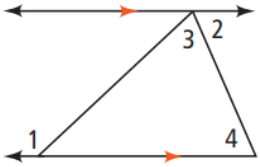
If a triangle has sides of 5ft and 8ft, what are the range of possible side lengths for the third side?

Name: _____

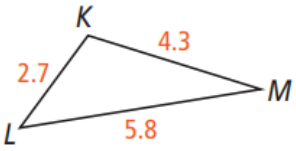
1. Explain why the measure of angle 1 is greater than the measure of angle 2 in each triangle below.

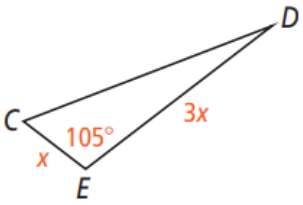


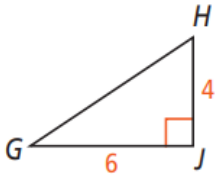




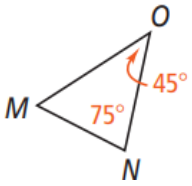
2. For each triangle below, list the angles in order from smallest to largest.

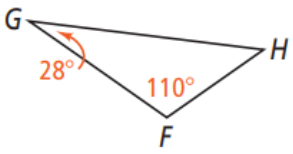


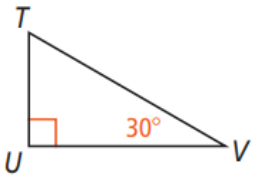




3. For each triangle below, list the sides in order from smallest to largest.







4. For each set below, can a triangle have the given side lengths? Why or why not?

    a. 2, 3, 6

    b. 11, 12, 15

    c. 8, 10, 19

5. The lengths of two sides of a triangle are given. What is the range for the length of the third side?

    a. 8 ft, 12 ft

    b. 5 in, 16 in

    c. 6 cm, 6 cm

6. Your family drives across Kansas on Interstate 70. A sign reads, “Wichita 90 mi, Topeka 110 mi.” Your little sibling says, “I didn’t know that it was only 20 miles from Wichita to Topeka.” Explain why the distance between the two cities does not have to be 20 mi.

7. Which segment is the shortest in each diagram?