Name: Key Hour: _____

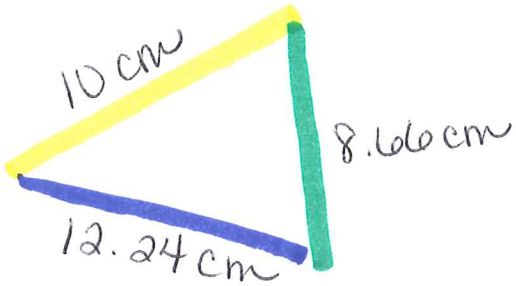
TRIANGLE INEQUALITIES

Can We Make a Triangle?

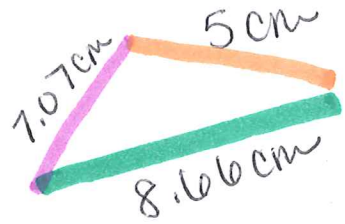
Take each of the side lengths from the anglegs and try to form a triangle. Draw the possible triangles in the space provided below. Label all the sides and measure all of the angles (the drawings should be scaled so that they will all fit into the space below). List the side lengths of any groups that don't form a triangle in the space provided. You must show at least 3 different lengths and pictures.

Triangles Formed

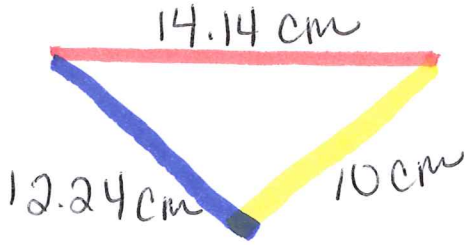
1.



2.

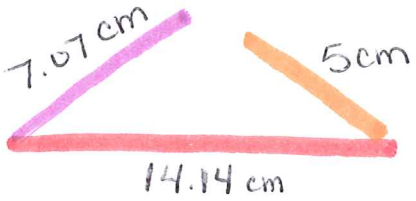


3.

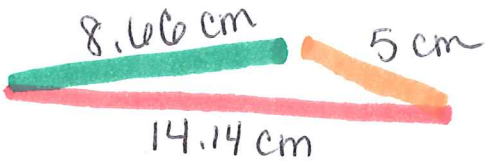


Lengths That Didn't Form a Triangle

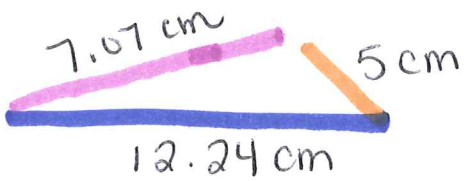
1.



2.



3.

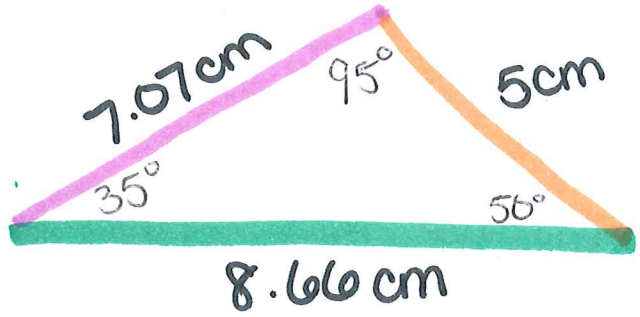


Look at the information above. Come up with a conclusion as to the relationship between the side lengths and whether or not they form triangles. What must occur in order to create a triangle?

Conclusion: Sum of any 2 side lengths is greater than the length of the 3rd side

Side Lengths and Angle Measures

Directions: Set up a triangle using **three different colored** anglegs and draw it below. They have lengths on them, so label your lengths on your drawing. Measure all angles and label them in your drawing.



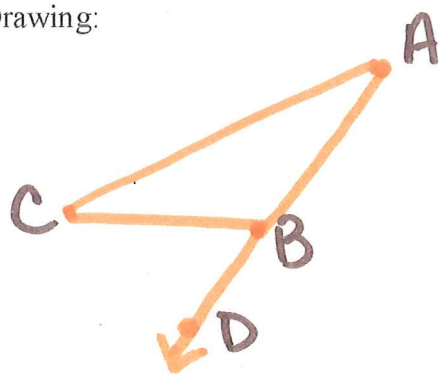
Now look at all of the triangles that were formed. Come up with a conclusion about the relationship between the opposite angles across from the sides of the triangles.

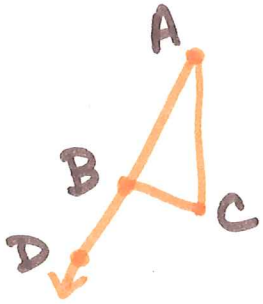
Conclusion: opposite the greatest angle is the greatest side (and vice versa)

Exterior Angles vs. Interior Angles, Is There a Relationship?

In the space provided below, draw a different scalene triangle *ABC*. Have at least one acute and one obtuse triangle. Extend side *AB* past point *B* and label a point *D* as the endpoint of the segment.

Drawing:





Angles $\angle A$ and $\angle C$ are called the ***remote interior angles*** of the exterior angle $\angle CBD$.

What do you notice about <A+ <C and <CBD? Compare your results with your table partner. (use patty paper)

They are congruent.

Forming the Conjectures: Triangle Inequalities

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

Side-Angle Inequality Conjecture
In a triangle, if one side is longer than another side, then the angle opposite the longer side is the greatest angle. The ∠ opposite the smallest side is the smallest ∠.

Triangle Exterior Angle Conjecture
The measure of an exterior angle of a triangle is equal to the sum of the remote interior angles

Examples

1. Determine whether a triangle can be formed by the given set of sides. If not make a sketch demonstrating why it is not possible.
   a. 2 in, 4in, 5in
   b. 3 cm, 8 cm, 12 cm no
   c. 8 ft, 12 ft, 20 ft no

yes

2. a. If two of the sides of a triangle are 12 and 30, what is the range of possible values for the third side?

$\underline{18} < x < \underline{42}$
30-12 30+12

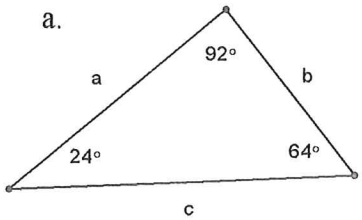
our 2 possibilities:
case 1 = 12 + 30 are the 2 smaller sides
case 2 = 30 is the largest side

b. If two of the sides of a triangle are 15 and 42, what is the range of possible values for the third side?

$\underline{27} < x < \underline{57}$
42-15 42+15

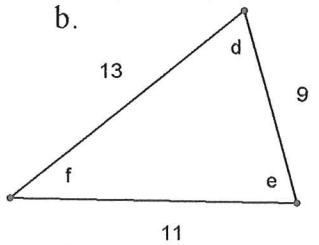
4. Arrange the unknown measures in order from **least to greatest.**

a.



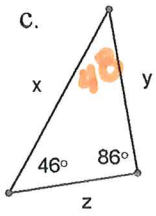
b, a, c

b.



f, d, e

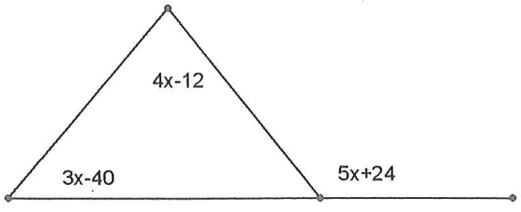
c.



y, z, x

Δ sum:
46 + 86 = 132
180 - 132 = 48

5. Solve for the missing variables in each of the following.



$4x - 12 + 3x - 40 = 5x + 24$
$7x - 52 = 5x + 24$
$2x - 52 = 24$
$2x = 76$
$x = 38$