

Geometry

Inequalities for Sides and
Angles of a Triangle



Recall...

Angle / Side Relationships in Triangles

Angles

3 angles congruent

2 angles congruent

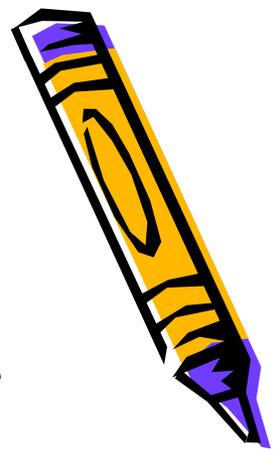
0 angles congruent

Sides

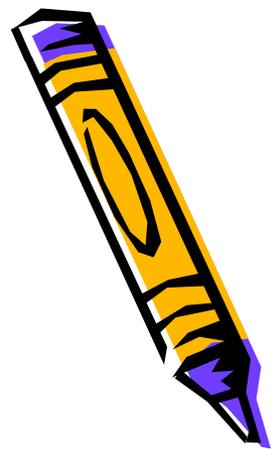
3 sides congruent

2 sides congruent

0 sides congruent



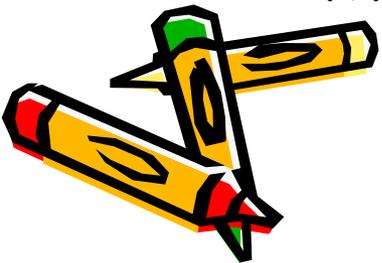
Inequalities for Sides and Angles of a Triangle



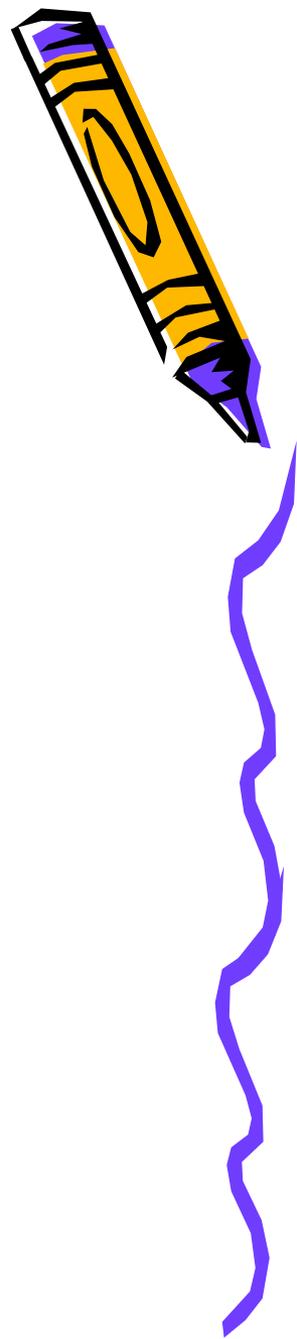
In one triangle...

If one side is longer than another side, then the angle opposite the longer side has a greater measure than the angle opposite the shorter side.

If one angle has a greater measure than another angle, then the side opposite the greater angle is longer than the side opposite the lesser angle.



Inequalities for Sides and Angles of a Triangle

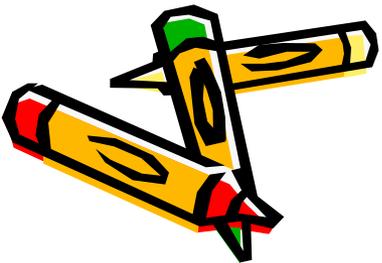


Simply put...

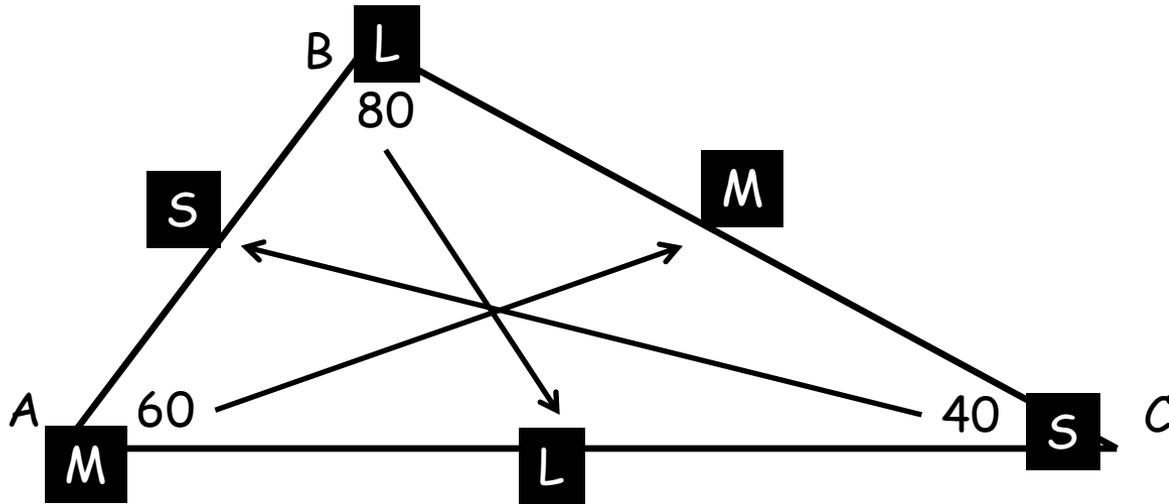
In a triangle...

- The biggest side is opposite the biggest angle
- The smallest side is opposite the smallest angle

Tip: Label the parts S , M , L then address the specifics of the problem



Inequalities for Sides and Angles of a Triangle



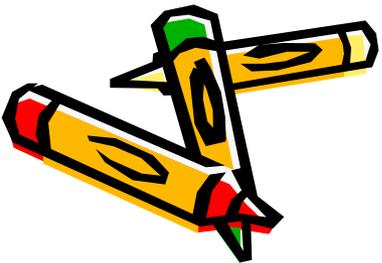
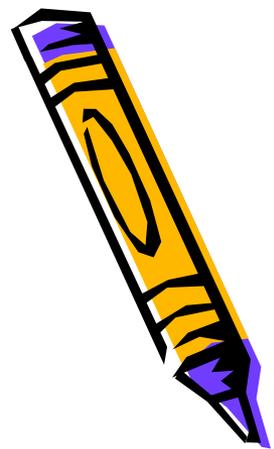
Knowing the measurement of the 3 angles of the triangle...

We can determine that:

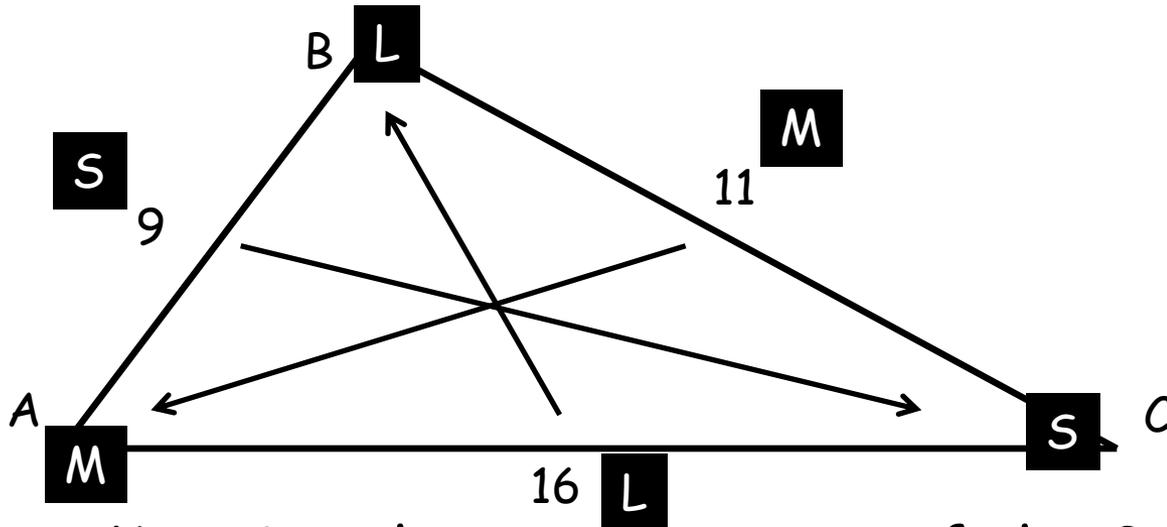
AB is the shortest side

BC is the medium length side

AC is the longest side



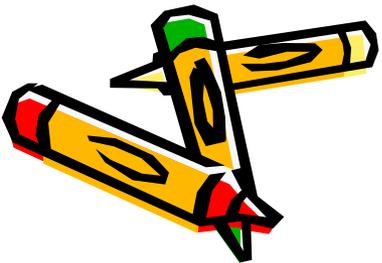
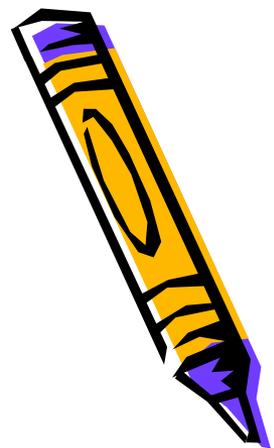
Inequalities for Sides and Angles of a Triangle



Knowing the measurement of the 3 sides of the triangle...

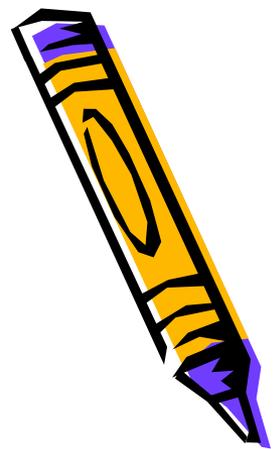
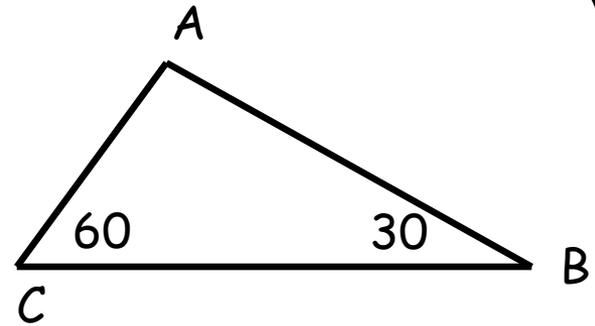
We can determine that:

- $\angle C$ is the smallest angle
- $\angle A$ is the medium size angle
- $\angle B$ is the largest angle

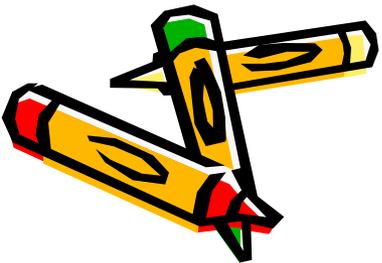
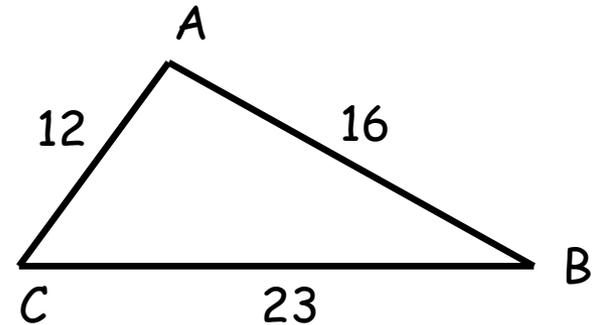


Apply

List the sides of the triangle from shortest to longest.

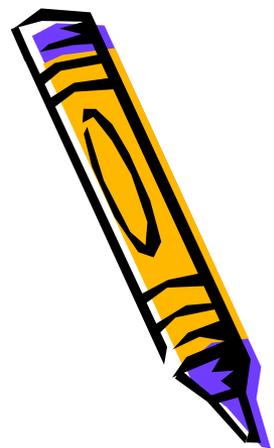
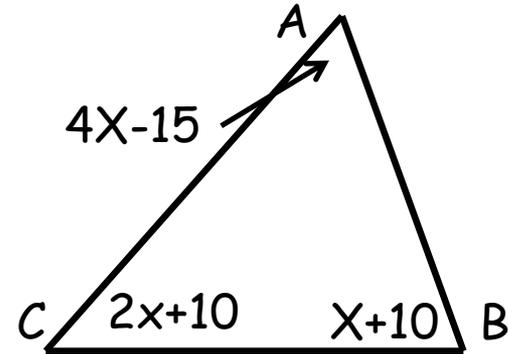


List the angles of the triangle from largest to smallest.

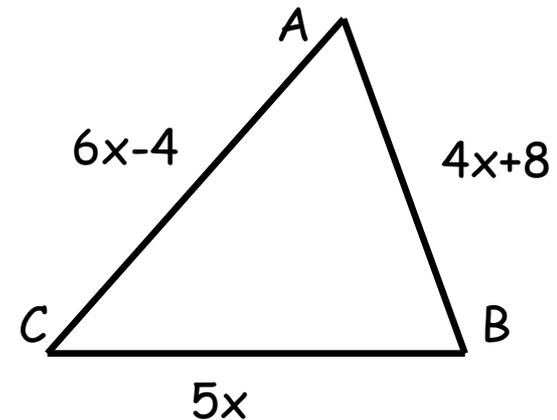


Apply

List the sides of the triangle from shortest to longest.



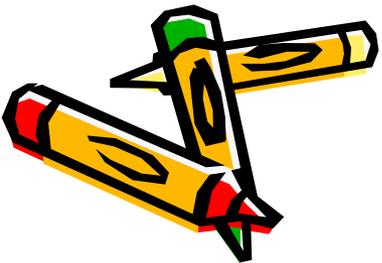
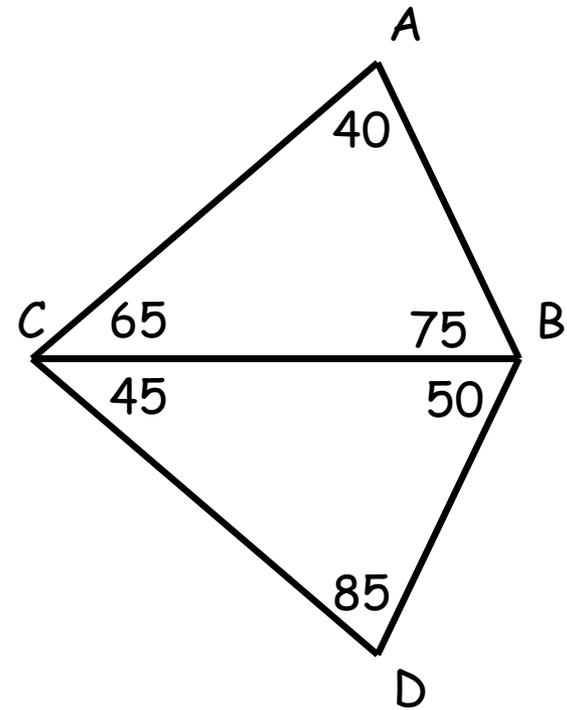
List the angles of the triangle from largest to smallest.
Perimeter = 154



Applying this to more complex figures

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

List the sides of $\triangle DBC$
from shortest to longest.

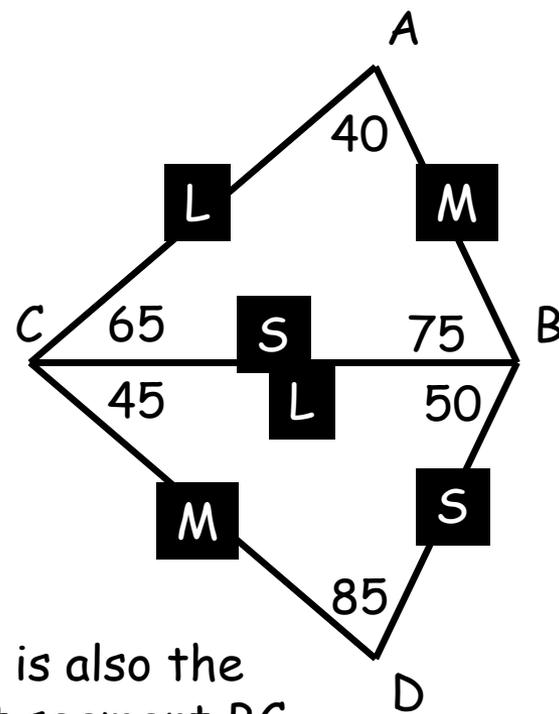


Applying this to more complex figures



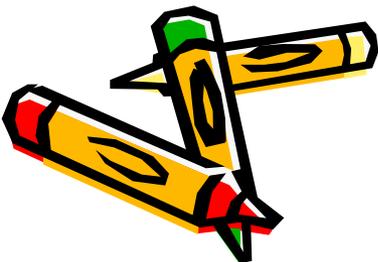
List the sides of $\triangle ABC$
from shortest to longest.

List the sides of $\triangle DBC$
from shortest to longest.

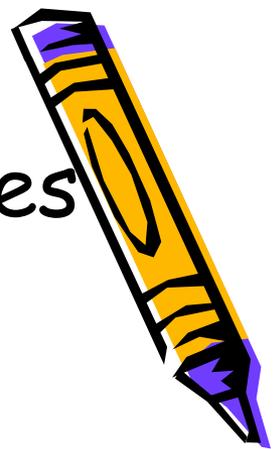


Notice that the shortest side of $\triangle ABC$ is also the longest side of $\triangle DBC$. That means that segment BC is neither the shortest or the longest segment in the figure.

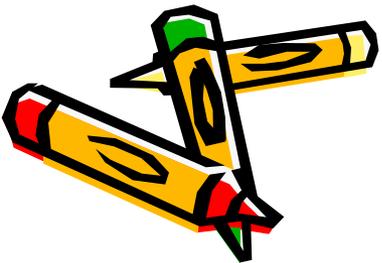
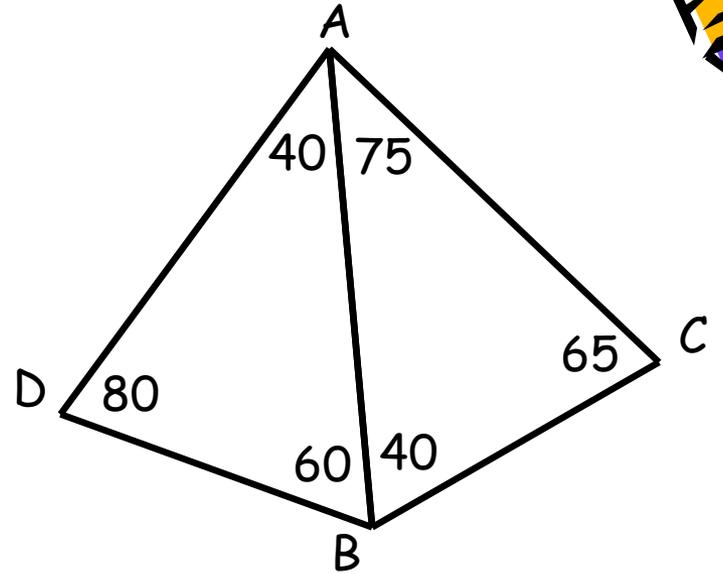
In effect, they cancel each other out and the longest segment in the figure is \overline{AC} , the shortest segment in the figure is \overline{BD} .



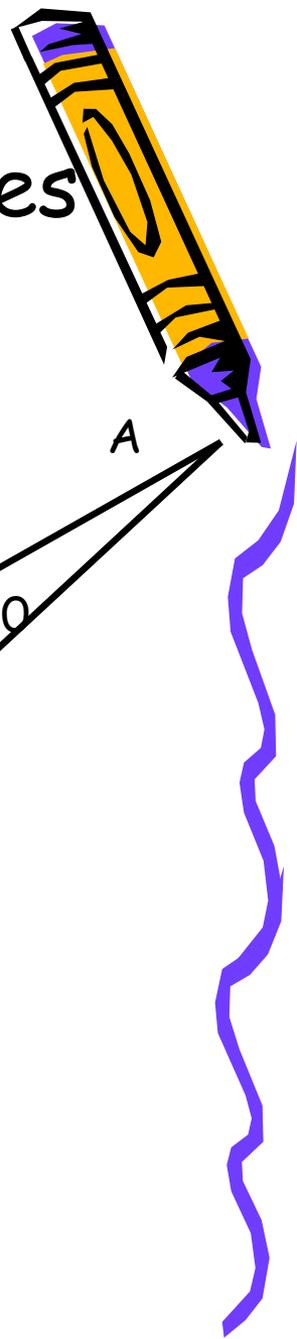
Applying this to more complex figures



Identify the longest side of the figure.



Applying this to more complex figures



Identify the shortest side of the figure.

