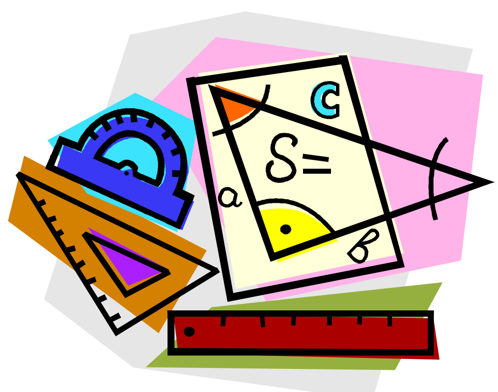
# Geometry

## Unit 4
## Congruent Triangles



**Name:**__________________________________________

# Geometry
## Chapter 4 – Congruent Triangles

******In order to get full credit for your assignments they must me done on time and you must SHOW ALL WORK. ******

**1.____ (4-1) Classifying Triangles –Day 1** Page 180-181 # 1-4, 7-10, 22-29, 32, 33

**2. ____ (4-2) Angles of Triangles –Day 1** Page 189 # 11-38, 47

**3. ____ (4-2) Angles of Triangles – Day 2** 4-2 Practice Worksheet

**4. ____ (4-6) Isosceles Triangles – Day 1** Page 219 – 220 # 9 – 28, 35 – 37

**5.____ (4-6) Isosceles Triangles – Day 2** 4-6 Practice Worksheet

6. _____**4-1, 4-2, 4-6 Test**

**7. ____ (4-3) Congruent Triangles – Day 1** Page 195 # 9 – 20, 22 – 25, 29 – 32

**8. ____ (4-3) Congruent Triangles – Day 2** 4-3 Practice Worksheet

**9. ____ (4-4) Proving Congruence – SSS, SAS – Day 1** Page 204 – 205 # 10, 11, 14 – 25

**10. ____ (4-4) Proving Congruence – SSS, SAS – Day 2** 4-4 Practice Worksheet

**11. ____ (4-5) Proving Congruence – ASA, AAS – Day 1** Page 211 # 9 – 20, 25 – 28

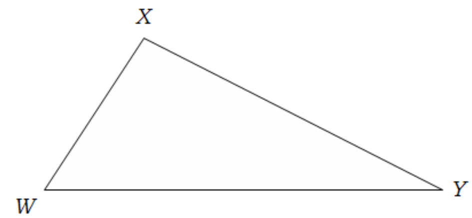
**12. ____ (4-5) Proving Congruence – ASA, AAS – Day 2** 4-5 Practice Worksheet

**13. ____ Chapter 4 Review WS**

## Section 4 – 1: Classifying Triangles
*Notes*

**Parts of a Triangle:**

Triangle – a three-sided polygon




Name –

Sides –

Vertices –

Angles –

**Classifying Triangles by Angles:**

**Acute Δ** **Obtuse Δ** **Right Δ**

**Equiangular Δ -**

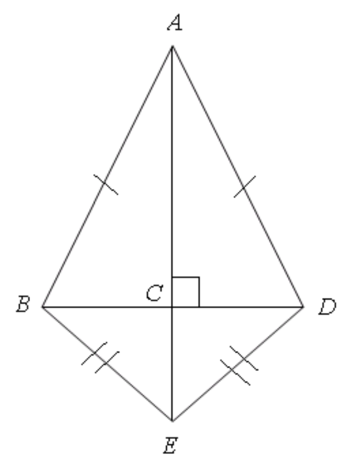
**<u>Classifying Triangles by Sides</u>:**

**Scalene Δ** **Isosceles Δ** **Equilateral Δ**

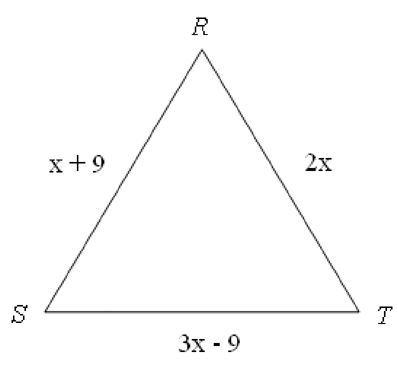
**Example #1:** Identify the indicated type of triangle in the figure.

a.) isosceles triangles

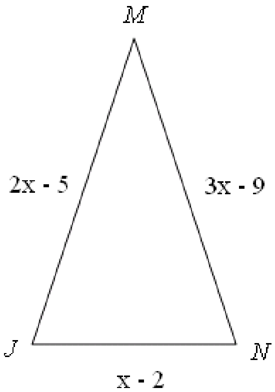
b.) scalene triangles




**Example #2:** Find *x* and the measure of each side of equilateral triangle *RST*.



**Example #3:** Find $x$, $JM$, $MN$, and $JN$ if $\Delta JMN$ is an isosceles triangle with $\overline{JM} \cong \overline{MN}$.




## CRITICAL THINKING

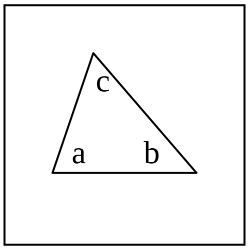
1) $\overline{KL}$ is a segment representing one side of isosceles right triangle $KLM$, with $K(2, 6)$, and $L(4, 2)$. $\angle KLM$ is a right angle, and $\overline{KL} \cong \overline{LM}$. Describe how to find the coordinates of vertex $M$ and name these coordinates.

# Angles of Triangles      Section 4-2

## <u>Angle Sum Activity</u>

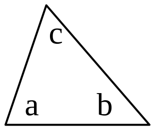
Draw a large triangle on your paper. (Use half the sheet of 8 ½ x 11 paper)

STEP 1



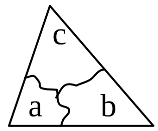

Write a, b and c in the interiors of the three angles of the triangle.

STEP 2




Carefully cut out the triangle.

STEP 3




Tear off the three angles.

STEP 4

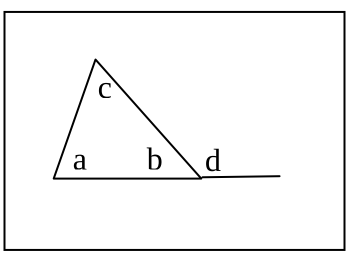
Arrange the three angles in such a way as to show their sum.

**CONJECTURE: Sum of the angles of any triangle is _______________**

## *Exterior Angle Activity*

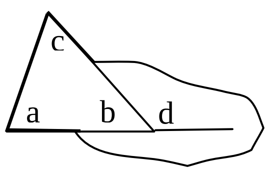
Draw a large triangle on your paper. (Use half the sheet of 8 ½ x 11 paper). Extend one side of the triangle to form an exterior angle. (See diagram in step 1)

STEP 1



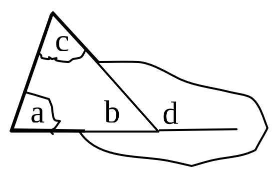

Write a, b, and c in the interiors of the three angles, and d in the exterior angle formed.

STEP 2




Carefully cut out the triangle and extended side as shown in the diagram.

STEP 3



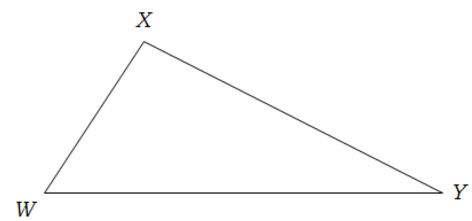

Tear off angles a and c only. Arrange angles a and c in such a way as to show their relationship to angle d.

**CONJECTURE: The measure of the exterior angle of any triangle is**

_________________________________________________________________________________

Date: ______________________________

# Section 4 – 2: Angles of Triangles
*Notes*

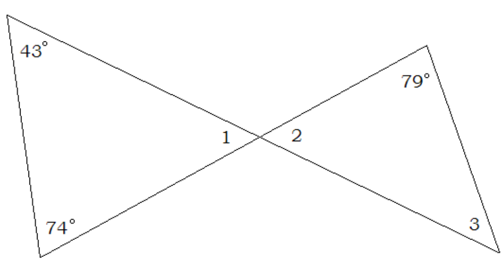



**Angle Sum Theorem:**

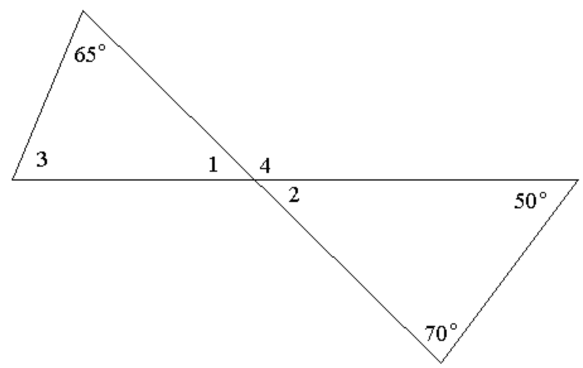
- The sum of the measures of the angles of a ____________________ is __________.

**Example #1:** Find the missing angle measures.

a.)

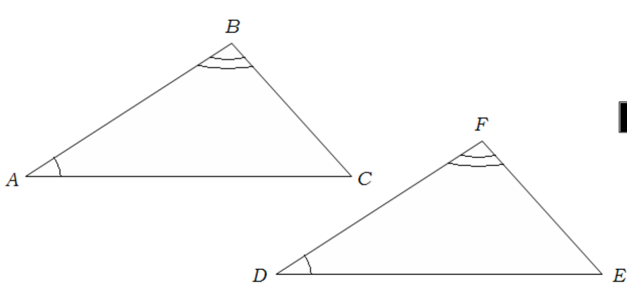


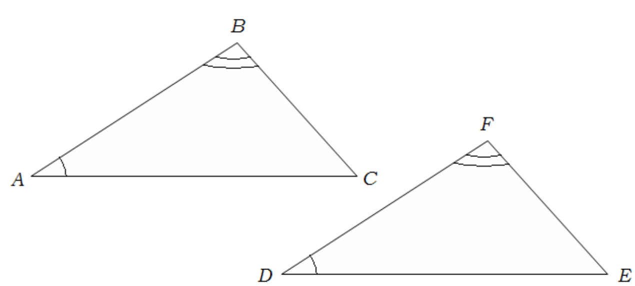

b.)




**Third Angle Theorem:**

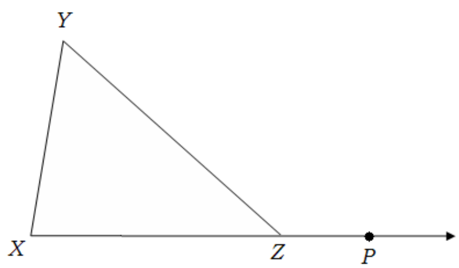
- If two angles of one triangle are ______________________ to two angles of a second triangle, then the third angles of the triangles are ______________________.



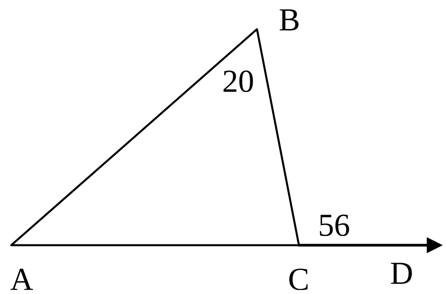
**<u>Exterior Angle Theorem</u>:**

- An **exterior angle** is formed by one side of a ________________ and the extension of another __________.
- **Remote interior angles** are the angles of a triangle that are not ________________ to a given __________________ angle.
- The measure of an exterior angle of a triangle is ____________ to the sum of the measures of the two ________________ interior angles.



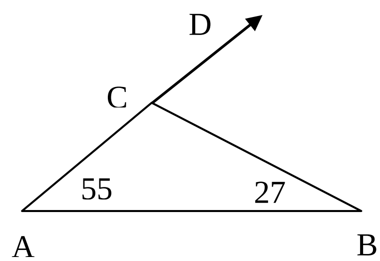

**Example #2:** Find the measure of each of the following angles.

a.)




$m\angle A=$

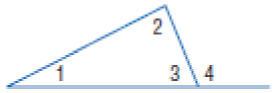
b.)




$m\angle DCB=$

## CRITICAL THINKING

1) Find the Error: Najee and Kara are discussing the Exterior Angle Theorem.




Najee

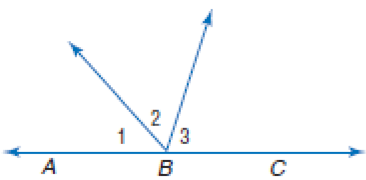
$m\angle 1 + m\angle 2 = m\angle 4$

Kara

$m\angle 1 + m\angle 2 + m\angle 4 = 180$

Who is correct? Explain your reasoning.

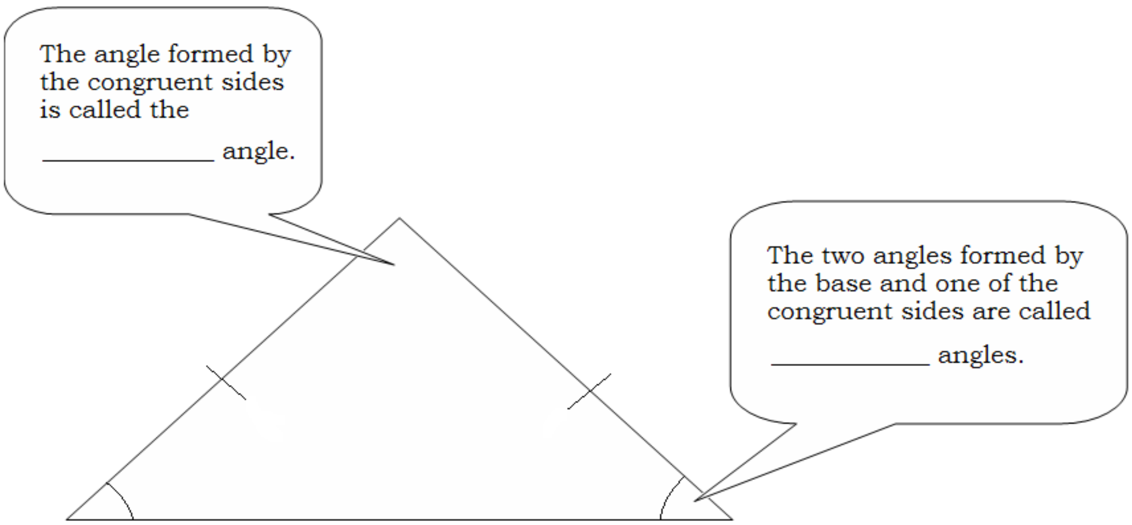
2) $\overrightarrow{BA}$ and $\overrightarrow{BC}$ are opposite rays. The measures of $\angle 1$, $\angle 2$, and $\angle 3$ are in a 4:5:6 ratio. Find the measure of each angle.



Date: ______________________________

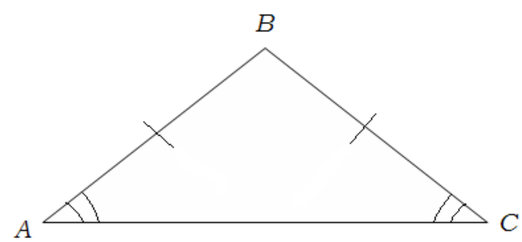
## Section 4 – 6: Isosceles Triangles
*Notes*

**Isosceles Triangle:** A triangle with at least __________ sides congruent.

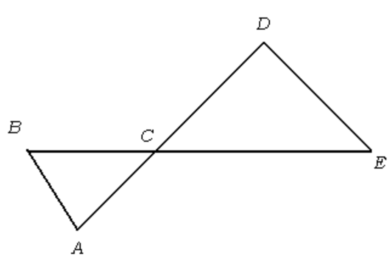



**Isosceles Triangle Theorem:** If two sides of a triangle are ____________________, then the angles opposite those sides are ____________________.

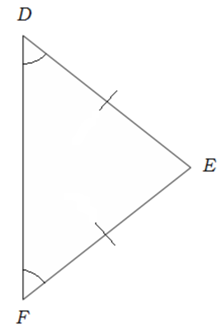
**Ex:**




**Example #1:** If $\overline{DE} \cong \overline{CD}$, $\overline{BC} \cong \overline{AC}$, and $m\angle CDE = 120$, what is the measure of $\angle BAC$?

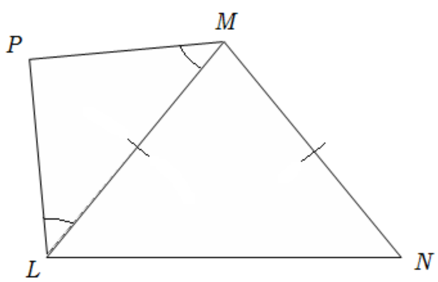


**<u>Theorem 4.10</u>:** If two angles of a ______________ are congruent, then the sides opposite those angles are _________________.




**Ex:**

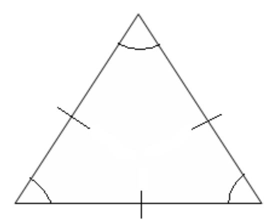
**Example #2:**



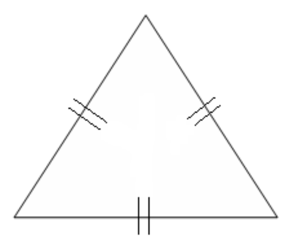

a.) Name all of the congruent angles.

b.) Name all of the congruent segments.

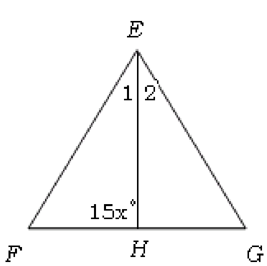
**<u>Corollary 4.3</u>:** A triangle is ___________________ if and only if it is _________________.



**<u>Corollary 4.4</u>:** Each angle of an equilateral triangle measures _______.



**Example #3:** $\Delta EFG$ is equilateral, and $\overline{EH}$ bisects $\angle E$.

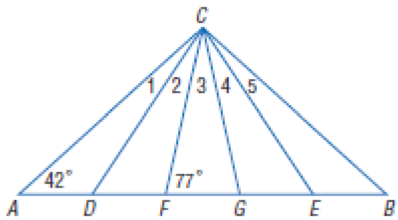



a.) Find $m\angle 1$ and $m\angle 2$.

b.) Find x.

## **CRITICAL THINKING**

1) In the figure, $\Delta ABC$ is isosceles, $\Delta DCE$ is equilateral, and $\Delta FCG$ is isosceles. Find the measure of the five numbered angles at vertex $C$.

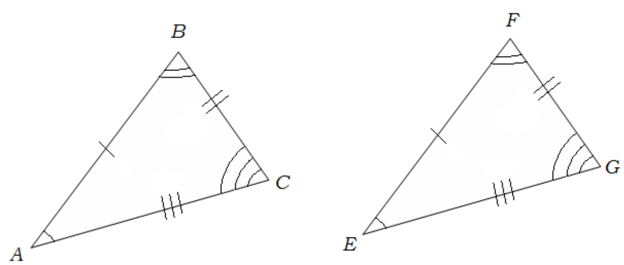


Date: ______________________________

## Section 4 – 3: Congruent Triangles
*Notes*

**Congruent Triangles:** triangles that are the same ________ and ________

- Each triangle has three ____________ and three __________.
- If all _______ of the corresponding parts of two triangles are ___________________, then the triangles are _________________.




***Congruent Triangles:***

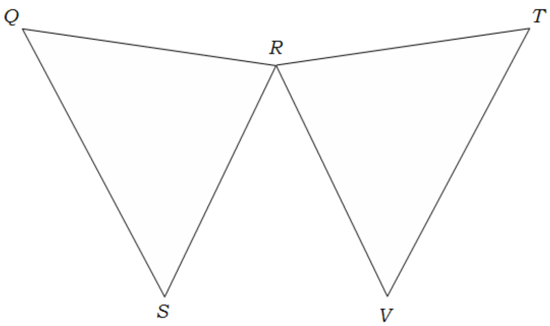
***Corresponding Congruent Angles:***

***Corresponding Congruent Sides:***

**Definition of Congruent Triangles (CPCTC):**

- Two triangles are congruent if and only if their corresponding parts are ______________________.
- ***CPCTC –*** Corresponding parts of congruent triangles are congruent

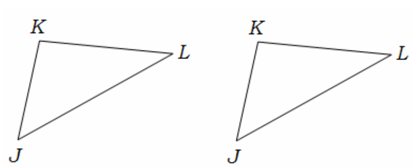
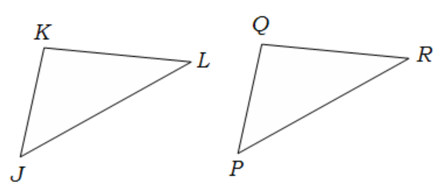
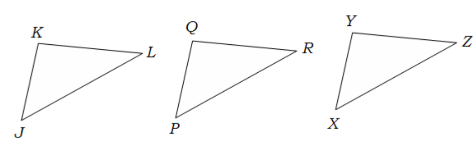
**Example #1:** In the following figure, $QR = 12$, $RS = 23$, $QS = 24$, $RT = 12$, $TV = 24$, and $RV = 23$.




***Name the corresponding congruent angles and sides.***

***Name the congruent triangles.***

## <u>Properties of Triangle Congruence</u>:

| ***<u>Reflexive</u>*** | ***<u>Symmetric</u>*** | ***<u>Transitive</u>*** |
|---|---|---|
|   |   |   |
| | | |

**Example #2:** If $\Delta WXZ \cong \Delta STJ$, name the congruent angles and congruent sides.

*Angles –*

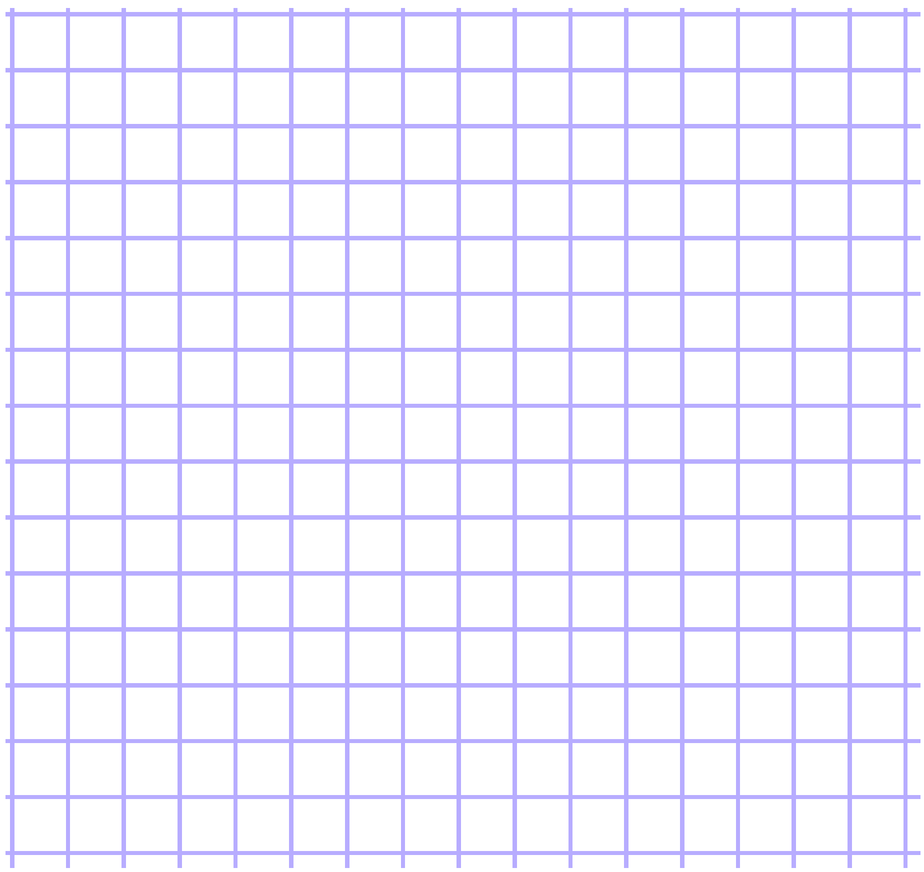
*Sides –*

## **CRITICAL THINKING**

1) Is the following always, sometimes, or never true? Give a counterexample if you answer sometimes or never:

   Two triangles with corresponding congruent angles are congruent.

2) The vertices of $\Delta WXZ$ are $W$ (-5, 7), $X$ (-8, 6), and $Z$ (-3, 3). The vertices of $\Delta ABC$ are $A$ (5, 7), $B$ (8, 6), and $C$ (3, 3). Graph the two triangles and verify that $\Delta WXZ \cong \Delta ABC$

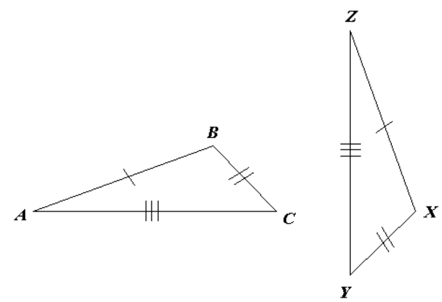


**Date:** ____________________________

## Section 4 – 4: Proving Congruence – SSS, SAS
*Notes*

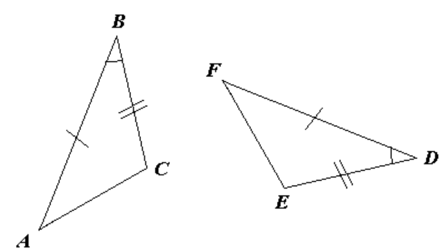
**Side–Side–Side Congruence:** If the __________ of one triangle are congruent to the sides of a second triangle, then the triangles are _________________.

*Abbreviation:*




**Side–Angle–Side Congruence:** If two sides and the included ___________ of one triangle are congruent to two __________ and the included angle of another triangle, then the triangles are _________________.

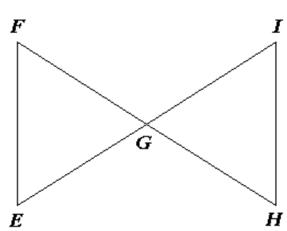
*Abbreviation:*




**Example #1:** Write a proof.

*Given:* $\overline{EI} \cong \overline{FH}$, $\overline{FE} \cong \overline{HI}$, and $G$ is the midpoint of both $\overline{EI}$ and $\overline{FH}$.

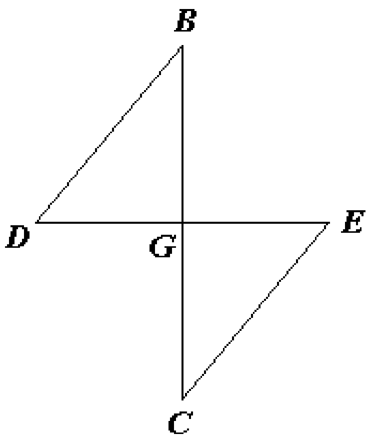
*Prove:* $\Delta FEG \cong \Delta HIG$



**Example #2:** Write a proof.

***Given:*** $\overline{DE}$ and $\overline{BC}$ bisect each other.

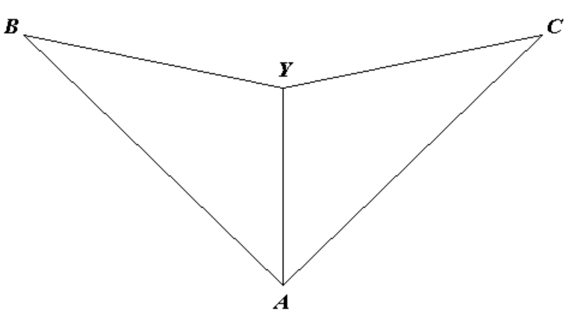
***Prove:*** $\Delta DGB \cong \Delta EGC$




**Example #3:** Write a proof.

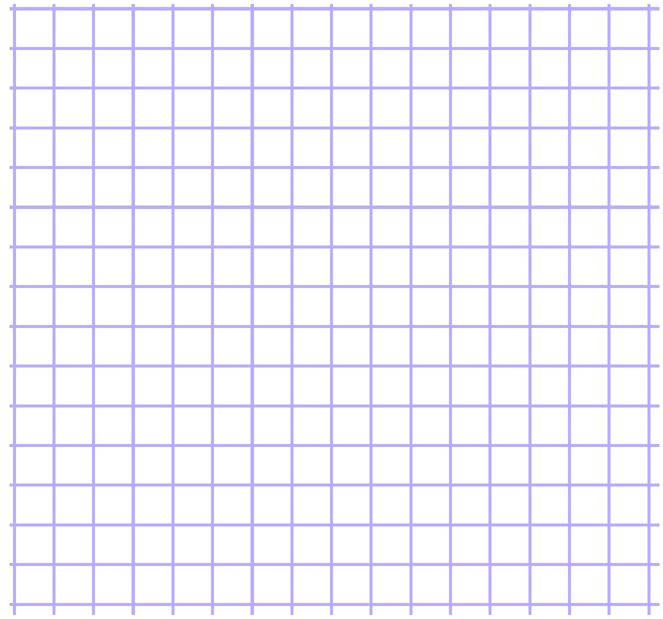
***Given:*** $\overline{AB} \cong \overline{AC}$ and $\overline{BY} \cong \overline{CY}$

***Prove:*** $\Delta BYA \cong \Delta CYA$



## CRITICAL THINKING

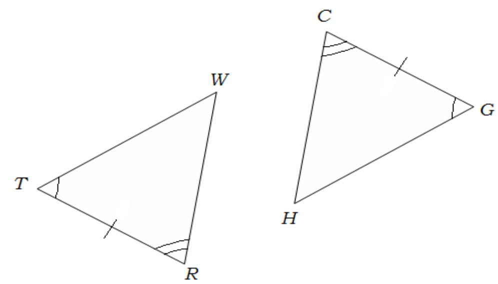
1) Graph triangles $\triangle DGB$ and $\triangle EFC$. Determine whether they are congruent.
   *D* (2, 5), *G* (1, 1), *B* (5, 2), *E* (-3, 0), *F* (-7, 1), *C* (-4, 4).



**Date:** ______________________________

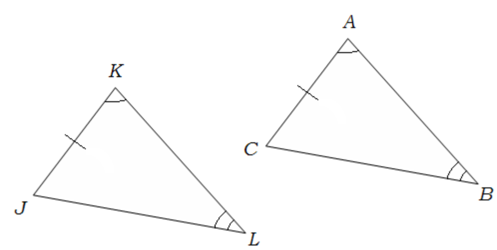
## Section 4 – 5: Proving Congruence – ASA, AAS
***Notes***

**Angle–Side–Angle Congruence:** If two ____________ and the included ________ of one triangle are congruent to two angles and the included side of another triangle, then the triangles are ____________________.




***Abbreviation:***

**Angle–Angle–Side Congruence:** If two angles and a non-included side of one triangle are congruent to the corresponding two _____________ and a side of a second triangle, then the two triangles are ____________________.



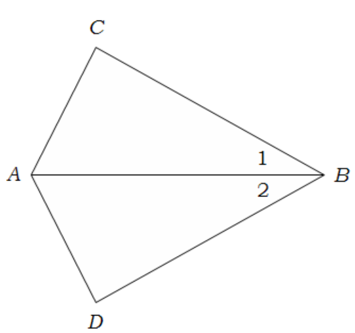

***Abbreviation:***

**Example #1:** Write a two-column proof.

***Given:*** $\overline{AB}$ bisects $\angle CAD$

$\angle 1 \cong \angle 2$

***Prove:*** $\Delta CAB \cong \Delta DAB$

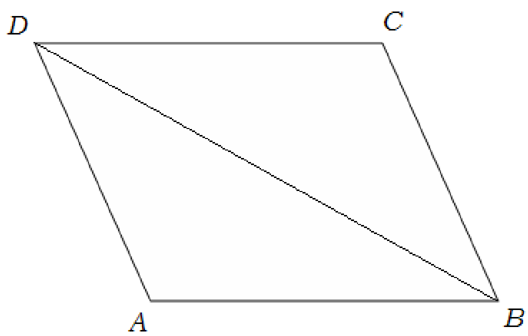


**Example #2:** Write a two-column proof.

***Given:*** $\overline{AD} \parallel \overline{CB}$

$\angle A \cong \angle C$

***Prove:*** $\Delta DGB \cong \Delta EGC$

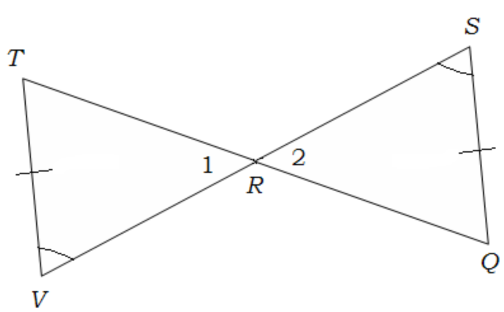



**Example #3:** Write a two-column proof.

***Given:*** $\angle V \cong \angle S$

$\overline{TV} \cong \overline{QS}$

***Prove:*** $\overline{VR} \cong \overline{SR}$



## <u>CRITICAL THINKING</u>

1) Explain the difference between the AAS Postulate and the ASA Postulate.

2) Is there an ASS Postulate? Give an example or counterexample.