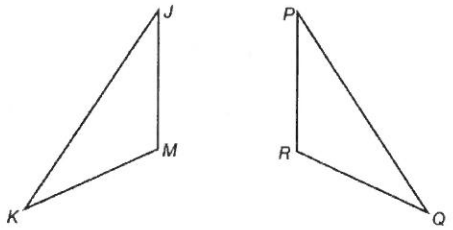
2.5 (EXTRA) Congruent Triangles Defined (Concept #21)

Two triangles are considered to be CONGRUENT (≅) when the following is true:



all corresponding ∠s are = AND all corresponding sides are =

This means that △KJM ≅△QPR

(we could also write this as △JMK ≅△PRQ or △MKJ ≅△RQP or △MJK ≅△RPQ or △KMJ ≅△QRP or △JKM ≅△PQR)

NOTE: The order of the letters in the first triangle must correspond to the correct order in the second triangle

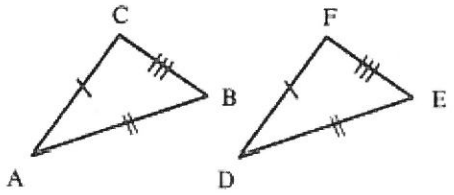
The following are congruent between the two triangles:

ANGLES: ∠K ≅ ∠Q, ∠J ≅ ∠P, ∠M ≅ ∠R

and SIDES: $\overline{KJ} \cong \overline{QP}$, $\overline{JM} \cong \overline{PR}$, $\overline{MK} \cong \overline{RQ}$

THERE ARE FIVE WAYS TO DETERMINE IF TWO TRIANGLES ARE CONGRUENT:

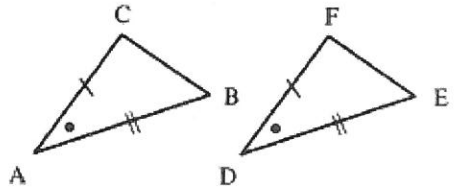
1. SSS Postulate (Side, Side, Side)



$\Delta ABC \cong \Delta DEF$

If three sides of one triangle are congruent to three sides of another triangle, the two triangles are congruent.

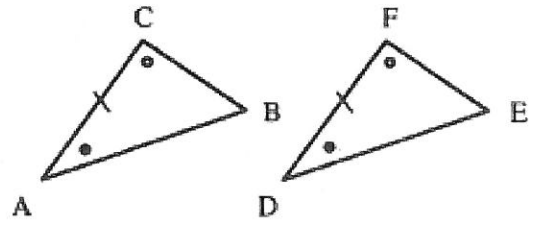
2. SAS Postulate (Side, Angle, Side)



$\Delta ABC \cong \Delta DEF$

If two sides and the included angle of one triangle are congruent to two sides and the included angle of another triangle, the two triangles are congruent.

3. ASA Postulate (Angle, Side, Angle)

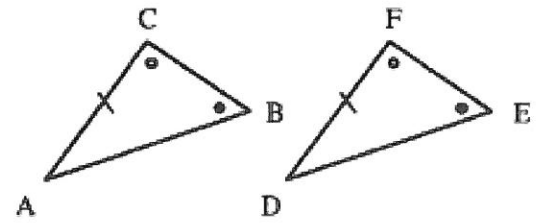


$\Delta ABC \cong \Delta DEF$

If two angles and the included side of one triangle are congruent to two angles and the included side of another triangle, the two triangles are congruent.

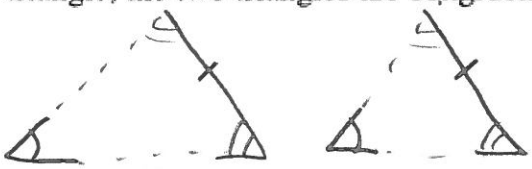
Note: The side must be in the middle.

4. AAS Postulate (Angle, Angle, Side)



$\Delta ABC \cong \Delta DEF$

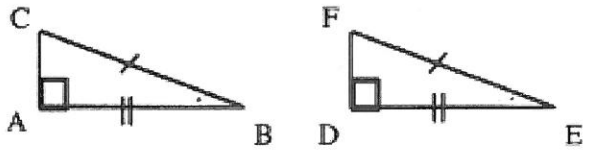
If two angles and a non-included side of one triangle are congruent to two angles and a non-included side of another triangle, the two triangles are congruent.



ASA but stated as AAS so they are congruent

* if we know 2 angles in a triangle the third angle have to be congruent.

5. HL Postulate (Hypotenuse, Leg)



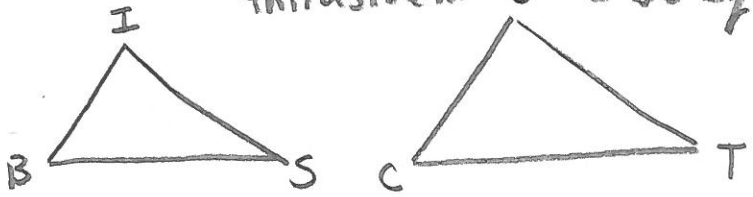
$\Delta ABC \cong \Delta DEF$

If the hypotenuse and one leg of a right triangle are congruent to the hypotenuse and leg of another right triangle, the two triangles are congruent.

You can always find the 3rd side by pythagorean theorem and if 2 sides are equal the third side has to be equal

EXAMPLE #2:

List the 6 congruencies if $\Delta BIS \cong \Delta CUT$.



Sides

$\overline{BT} \cong \overline{CU}$

$\overline{IS} \cong \overline{UT}$

$\overline{SB} \cong \overline{TC}$

Angles

$\angle B \cong \angle C$

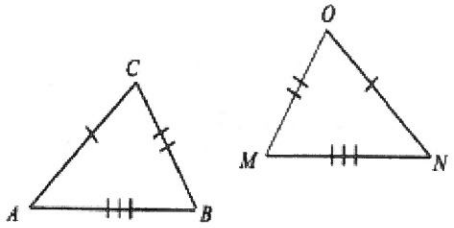
$\angle S \cong \angle T$

$\angle I \cong \angle U$

EXAMPLE #3:

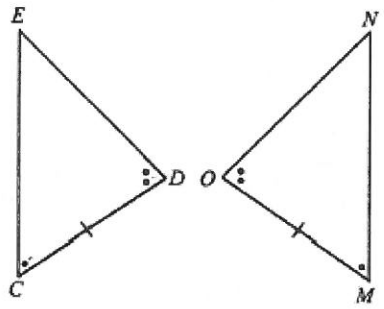
Determine if the following sets of triangles would be congruent using the above five reasons: SSS, ASA, SAS, AAS or HL. State the triangle congruency if there is one.

a)



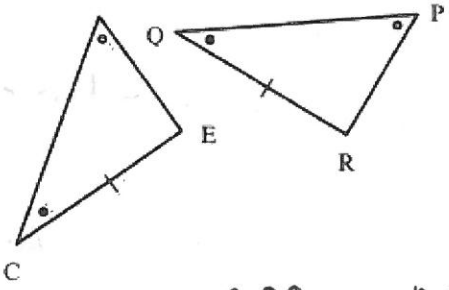
△ABC ≅ △MNO by SSS

b)



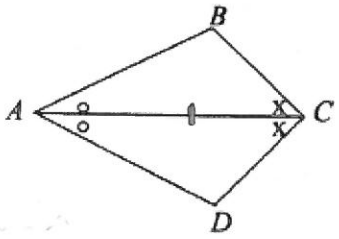
△ECD ≅ △NMO by ASA

c)



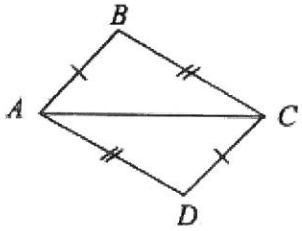
△CDE ≅ △QPR by AAS

d)



△ABC ≅ △ADC by ASA

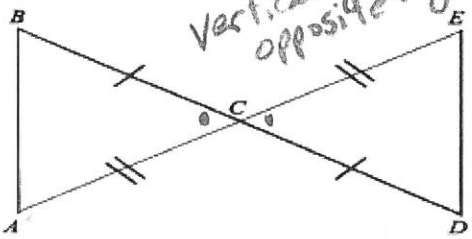
e)



△ABC ≅ △ADC by SSS

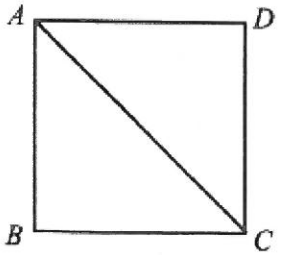
f)

Vertically opposite angles are equal



△ACB ≅ △ECD by SAS

g)



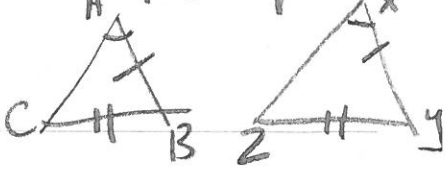
△_____ ≅ △_____ by _____

Not enough info all we know for sure is that the two triangles share one side

h) Not enough info

ASS

Not a postulate



2.5 : Assignment #1

1. a) **Complete the following chart.**

Suppose $\Delta BIG \cong \Delta CAT$.	
a) $\angle G \cong ? \angle T$	d) $\overline{BI} \cong ?$ $\overline{CA}$
b) $m\angle A = ?$ x I	e) $\Delta IGB \cong ?$ ΔATC
c) $\overline{AT} \cong ?$ $\overline{IG}$	f) $\Delta CTA \cong ?$ ΔBGI

b) Answer the following given $\Delta ABC \cong \Delta DEF$.

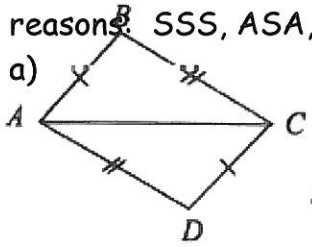
a) Name the three pairs of corresponding vertices. $\angle A \cong \angle D, \angle B \cong \angle E, \angle C \cong \angle F$

b) Name the three pairs of corresponding sides. $\overline{AB} \cong \overline{DE}, \overline{AC} \cong \overline{DF}, \overline{BC} \cong \overline{EF}$

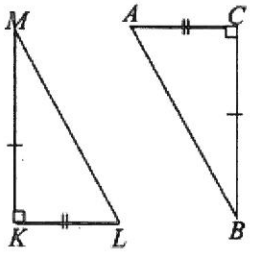
c) Is it correct to say $\Delta BAC \cong \Delta EFD$? No

d) Is it correct to say $\Delta CAB \cong \Delta FDE$? Yes

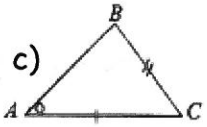
2. Determine if the following sets of triangles would be congruent using the above five reasons: SSS, ASA, SAS, AAS or HL. State the triangle congruency if there is one.

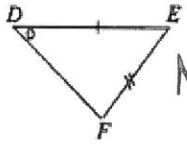
a) 

SSS
$\Delta ABC \cong \Delta CDA$

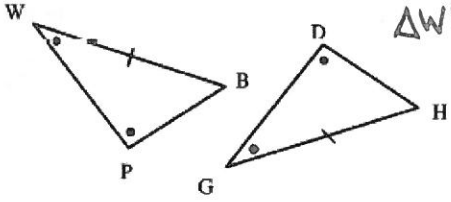
b) 

SAS
$\Delta MKL \cong \Delta BCA$

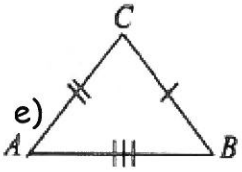
c) 

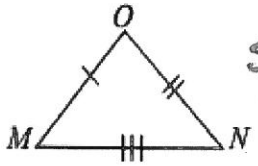


No Δ's are $\cong$

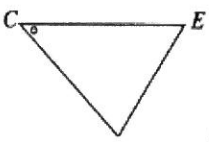
d) 

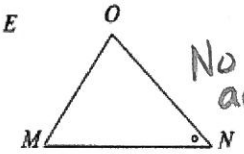
$\Delta WPB \cong \Delta GDH$
AAS

e) 

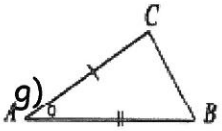


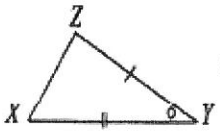
SSS
$\Delta ABC \cong \Delta NMO$

f) 

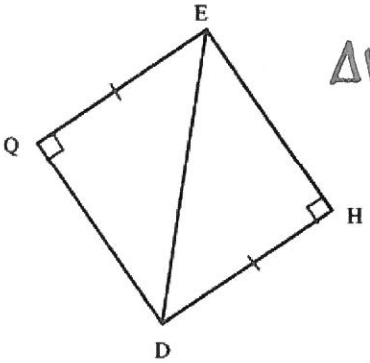


No Δ's are $\cong$

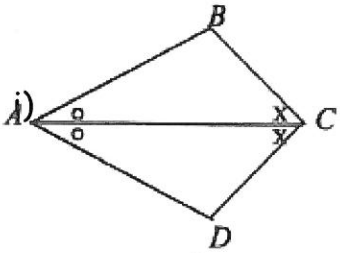
g) 



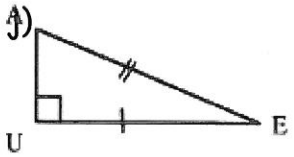
$\Delta ABC \cong \Delta YXZ$
SAS

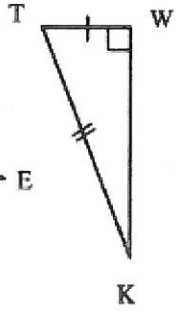
h) 

$\Delta EQD \cong \Delta DHE$
HL

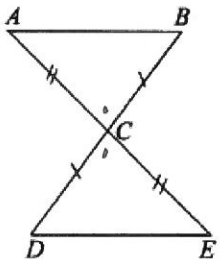
i) 

$\Delta ABC \cong$

j) 

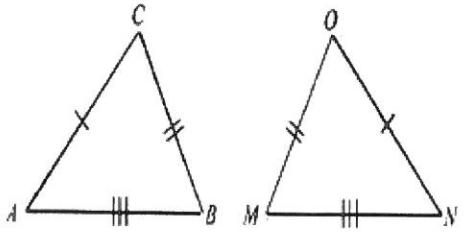


HL
$\Delta AUE \cong \Delta TWK$

k) 

$\Delta ACB \cong \Delta ECD$
SAS

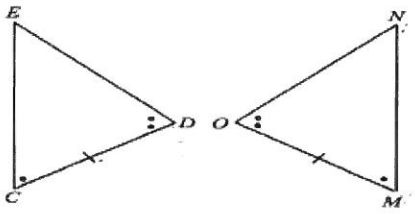
3. a) . Use the diagram to answer the question.



Which angle in ΔMON is equal to $\angle A$?

$\angle N$

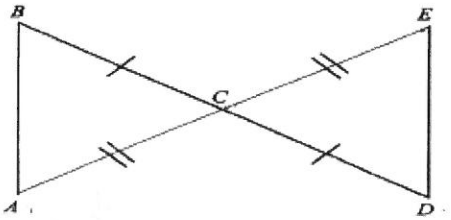
b) . Use the diagram to answer the question.



Which side in ΔCED is the same length as $\overline{MN}$?

$\overline{CE}$

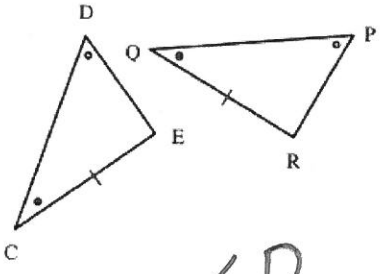
c) . Use the diagram to answer the question.



Which angle in ΔCDE is the same size as $\angle B$?

$\angle D$

d) Which angle in ΔPQR is the same measure as $\angle E$?



$\angle R$