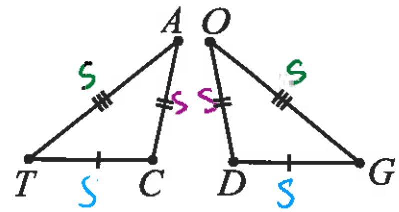
Geometry – Mr. Bo
Unit 5 - Day 1 Notes

Name:________________
Date:______________

Proving Triangles Congruent

There are only 5 ways to prove two triangles are congruent!

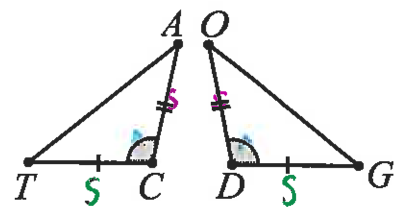
1. SSS: Side-Side-Side



Side $\overline{CT} \cong \overline{GD}$
Side $\overline{AC} \cong \overline{OD}$
Side $\overline{AT} \cong \overline{OG}$

$\triangle CAT \cong \triangle DOG$ By SSS

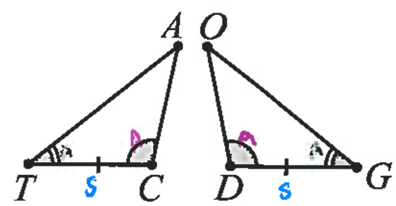
2. SAS: Side-Angle-Side



Side $\overline{TC} \cong \overline{GD}$
Angle $\angle C \cong \angle D$
Side $\overline{AC} \cong \overline{OD}$

$\triangle CAT \cong \triangle DOG$ By SAS

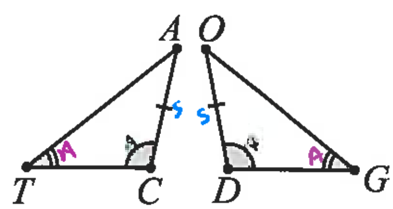
3. ASA: Angle-Side-Angle



Angle $\angle T \cong \angle G$
Side $\overline{TC} \cong \overline{GD}$
Angle $\angle C \cong \angle D$

$\triangle CAT \cong \triangle DOG$ By ASA

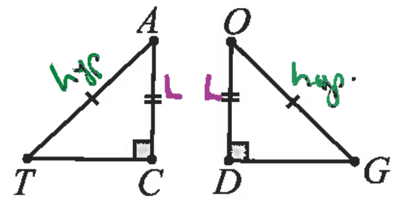
4. AAS: Angle-Angle-Side



Angle $\angle T \cong \angle G$
Angle $\angle C \cong \angle D$
Side $\overline{AC} \cong \overline{OD}$

$\triangle CAT \cong \triangle DOG$ By AAS

5. HL: Hypotenuse-Leg (Rt $\triangle$'s)

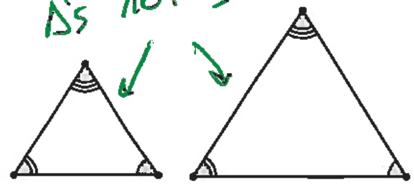


Hyp. $\overline{AT} \cong \overline{OG}$
Leg. $\overline{AC} \cong \overline{OD}$

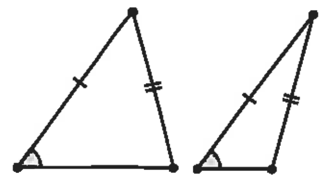
$\triangle CAT \cong \triangle DOG$ By HL.

Methods that DO NOT prove Triangles to be Congruent

Δ's not ≅



1. AAA: Angle-Angle-Angle

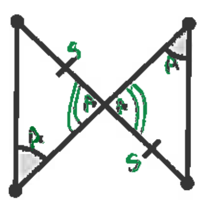


2. ASS or SSA: Angle-Side-Side

Δ's not ≅

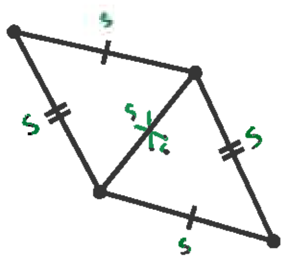
Examples: Which triangle postulate shows that the triangles are congruent?

1.



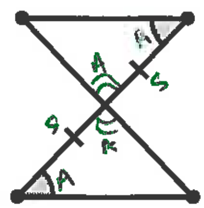
AAS

2.



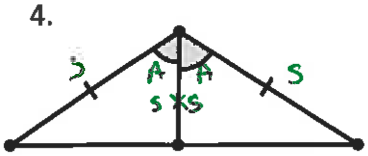
SSS

3.



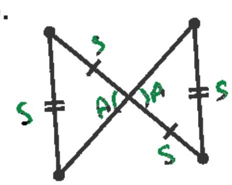
ASA

4.



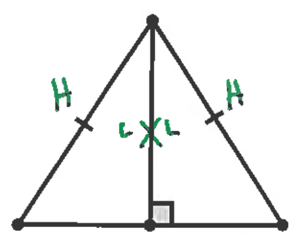
SAS

5.



Δ's not ≅ (ASS)

6.

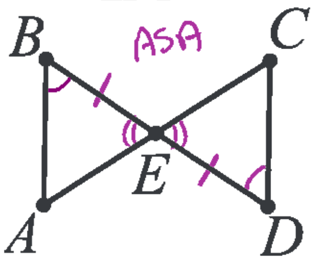


H-L

Examples:

1. Given: E midpoint of $\overline{BD}$

$\angle D \cong \angle B$



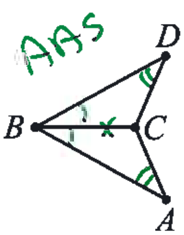
	Congruent Parts	Reason
A	$\angle B \cong \angle D$	Given
S	$\overline{BE} \cong \overline{DE}$	midpt makes 2 $\cong$ segs.
A	$\angle BEA \cong \angle DEC$	vert. $\angle$'s are $\cong$.

Name the Congruent Triangles: $\triangle BEA$ $\cong$ $\triangle DEC$ ASA

rigid motion: rotate $\triangle ABE$ 180° counter clockwise so $\triangle ABE$ maps to $\triangle CDE$.

2. Given: $\overline{BC}$ bisects $\angle ABD$

$\angle A \cong \angle D$



	Congruent Parts	Reason
A	$\angle A \cong \angle D$	Given
A	$\angle CBD \cong \angle CBA$	$\angle$ bisector ÷ $\angle$ into 2 $\cong$ $\angle$'s.
S	$\overline{BC} \cong \overline{BC}$	Reflexive.

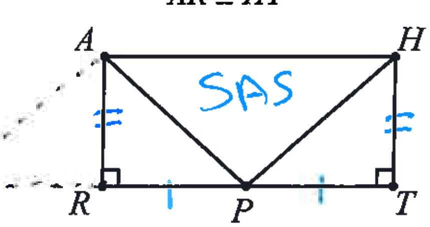
Name the Congruent Triangles: $\triangle CBD$ $\cong$ $\triangle CBA$ AAS.

rigid motion: Reflect $\triangle ABC$ over line $\overline{CB}$ so $\triangle ABC$ maps to $\triangle DBC$.

3. Given: P midpoint of $\overline{RT}$

$\angle R$ & $\angle T$ right angles

$\overline{AR} \cong \overline{HT}$



	Congruent Parts	Reason
S	$\overline{AR} \cong \overline{HT}$	Given
A	$\angle R \cong \angle T$	Rt $\angle$'s are $\cong$
S	$\overline{RP} \cong \overline{TP}$	midpt make 2 $\cong$ segs.

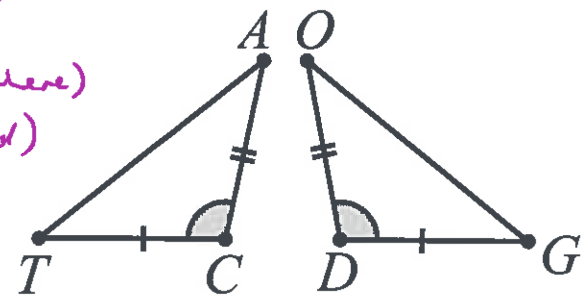
Name the Congruent Triangles: $\triangle ARP$ $\cong$ $\triangle HTP$ SAS.

rigid motion: Reflect $\triangle PTH$ over the $\perp$ bisector of $\overline{RT}$ so $\triangle PTH$ maps to $\triangle PRA$.

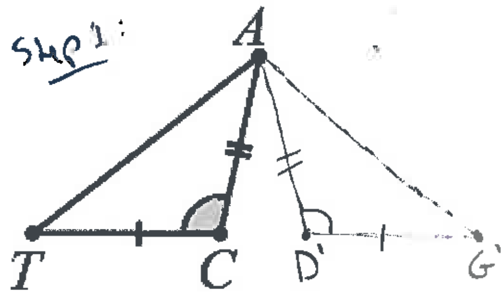
or Translate $\triangle PTH$ along vector $\overrightarrow{TR}$ so $\overline{TH}$ maps to $\overline{RA}$, forming $\triangle P'RA$.
reflect $\triangle P'RA$ over $\overline{RA}$ so that $\triangle P'RA$ maps to $\triangle PRA$.

Justify by rigid motions that SAS is true:

what? (is being moved)
where? (is it going)
how? (is it getting there)
why? (is ≅ preserved)



Step 1:



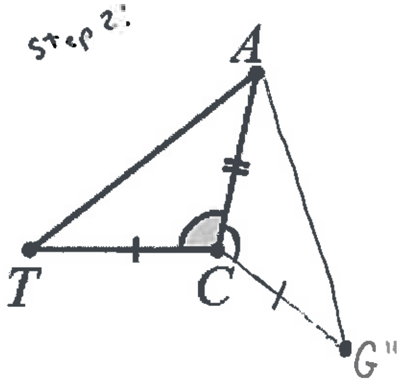
what · How

Translate △DOG along vector $\overrightarrow{OA}$

So O maps to A forming △D'AG'.

where

Step 2:



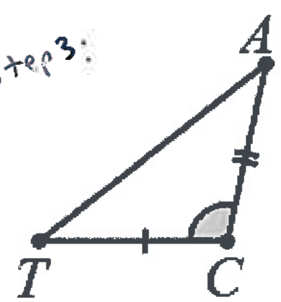
what · How

Rotate △D'AG' clockwise by m∠D'AC

So D' maps to C, forming △CAG" ← where

D' maps to C because $\overline{AD'} \cong \overline{AC}$ and Rotation preserves seg. length. ← why.

Step 3:



what. · How

Reflect △CAG" over $\overline{AC}$

So G" maps to T, forming △CAT. } where

G" maps to T because ∠ACG" ≅ ∠ACT and $\overline{CG''} \cong \overline{CT}$. Reflection preserves distance and angle measure. } why.