

Proving Triangles Congruent HSG-CO.B.8

Goal: I can prove triangles congruent using the postulate and theorems SSS, SAS, ASA, AAS, and HL.

Essential Questions:

1. How do you write a triangle congruence statement?
2. How can you identify corresponding parts in congruent triangles?
3. What does SSS, SAS, ASA, AAS, and HL represent and when do you use them?
4. When writing a proof why start off with a plan and what should this plan look like?

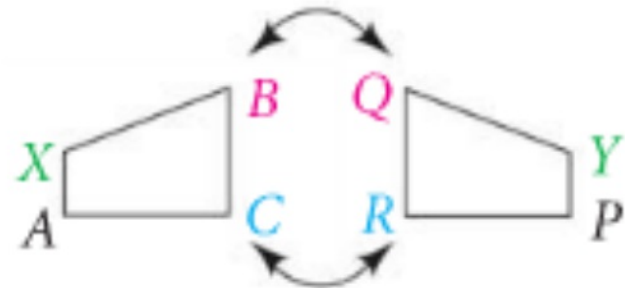
Congruent Figures

Geometric figures are congruent if they are the same size and shape. When two figures are congruent you can move one so that it fits perfectly on the other by a slide, flip, or turn.

Congruent polygons have congruent corresponding parts - their matching sides and angles. When naming congruent polygons always list the corresponding vertices in the same order.

Example: List the congruent corresponding parts.

$$\triangle WYS \cong \triangle MKV$$



C corresponds to R .

$\angle B$ corresponds to $\angle Q$.

\overline{AX} corresponds to \overline{PY} .

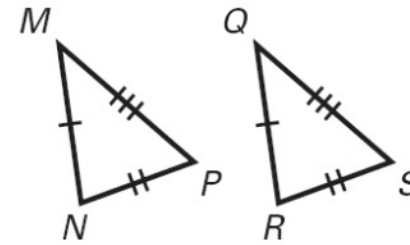
$$ACBX \cong PRQY$$

Triangle Congruence Statement

SIDE-SIDE-SIDE (SSS) CONGRUENCE POSTULATE

If three sides of one triangle are congruent to three sides of a second triangle, then the two triangles are congruent.

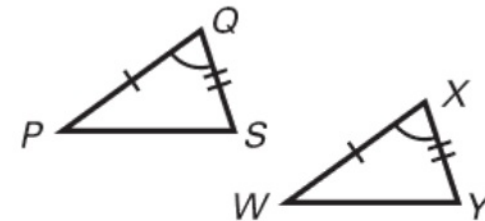
If Side $\overline{MN} \cong$ _____,
Side $\overline{NP} \cong$ _____, and
Side $\overline{PM} \cong$ _____,
then $\triangle MNP \cong$ _____.



SIDE-ANGLE-SIDE (SAS) CONGRUENCE POSTULATE

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

If Side $\overline{PQ} \cong$ _____,
Angle $\angle Q \cong$ _____, and
Side $\overline{QS} \cong$ _____,
then $\triangle PQS \cong$ _____.

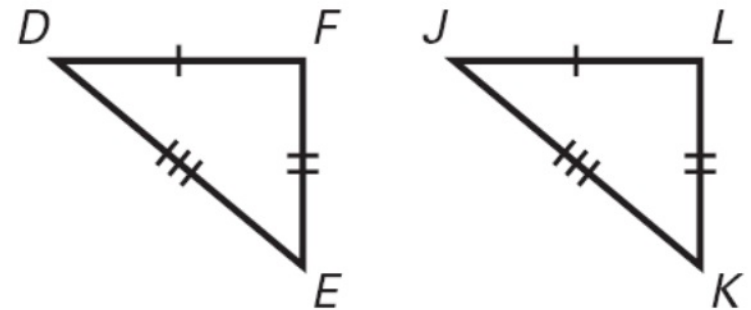


Prove that $\triangle DEF \cong \triangle JKL$.

Solution

Paragraph Proof The marks on the diagram show that $\overline{DE} \cong$ _____, _____ $\cong \overline{KL}$, and $\overline{DF} \cong$ _____. (from given information)

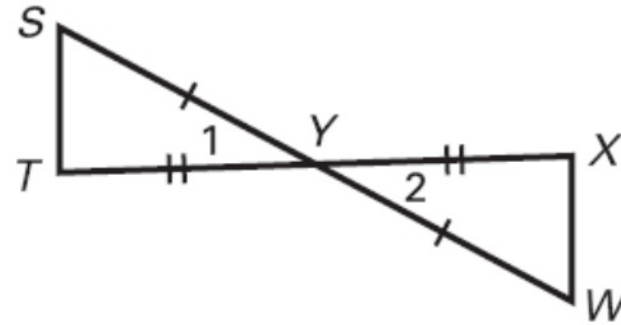
Therefore, the triangles are congruent by _____.



A paragraph proof is another way a proof is often written. The advantage of a paragraph proof is that you have the chance to explain your reasoning in your own words. In a paragraph proof, the statements and their justifications are written together in sentences following a logical order in a paragraph form.

Using the SAS Congruence Postulate in a Two-Column Proof

Prove that $\triangle SYT \cong \triangle WYX$.

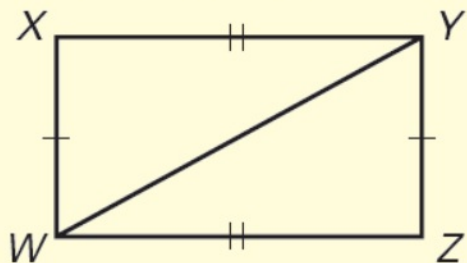


Statements	Reasons
1. $\overline{TY} \cong \underline{\hspace{2cm}}$, $\overline{SY} \cong \underline{\hspace{2cm}}$	1. Given
2. $\angle 1 \cong \angle 2$	2. _____
3. $\triangle SYT \cong \triangle WYX$	3. _____

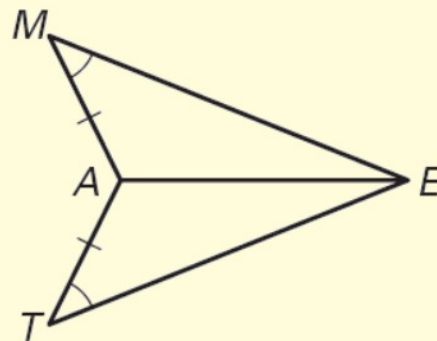
Two-Column Proof - A kind of proof in which the statements (conclusions) are listed in one column, and the reasons for each statement's truth are listed in another column. Identical in content, but different in form, from a paragraph proof.

- Decide whether enough information is given to prove that the triangles are congruent. If there is enough information, state the congruence postulate.

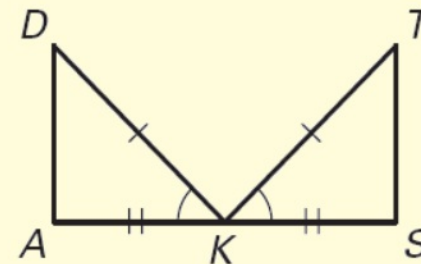
$\triangle XYW, \triangle ZWY$



$\triangle MAE, \triangle TAE$



$\triangle DKA, \triangle TKS$

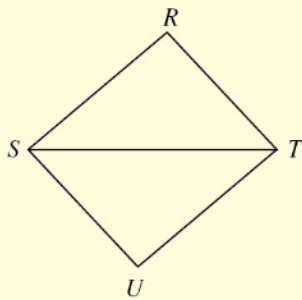


Goal: I can prove triangles congruent using the postulate and theorems SSS, SAS, ASA, AAS, and HL.

Justify the last two steps of the proof.

Given: $\overline{RS} \cong \overline{UT}$ and $\overline{RT} \cong \overline{US}$

Prove: $\triangle RST \cong \triangle UTS$



Proof:

1. $\overline{RS} \cong \overline{UT}$

2. $\overline{RT} \cong \overline{US}$

3. $\overline{ST} \cong \overline{TS}$

4. $\triangle RST \cong \triangle UTS$

1. Given

2. Given

3. ?

4. ?

A Symmetric Property of \cong ; SSS

C Reflexive Property of \cong ; SSS

B Reflexive Property of \cong ; SAS

D Symmetric Property of \cong ; SAS

Goal: I can prove triangles congruent using the postulate and theorems SSS, SAS, ASA, AAS, and HL.

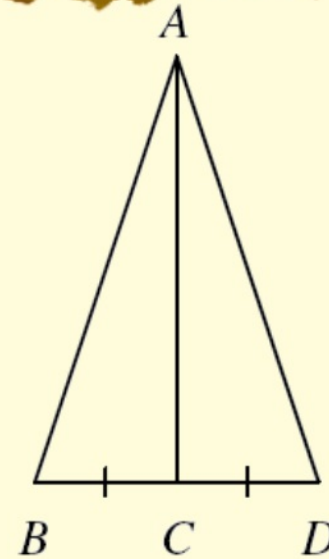
What other information do you need in order to prove the triangles congruent using the SAS Congruence Postulate?

A $\angle BAC \cong \angle DAC$

C $\overline{AC} \perp \overline{BD}$

B $\angle CBA \cong \angle CDA$

D $\overline{AC} \cong \overline{BD}$



Goal: I can prove triangles congruent using the postulate and theorems SSS, SAS.

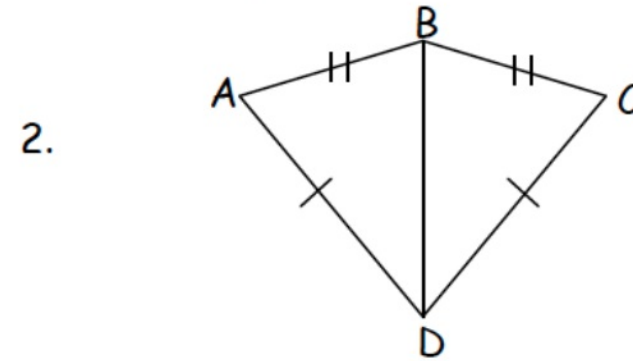
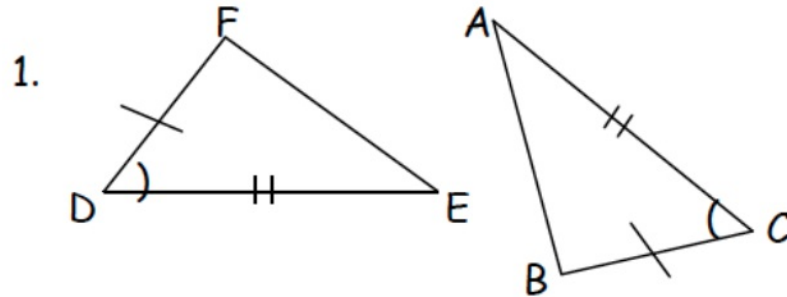
Essential Questions:

- 1. How do you write a triangle congruence statement?*
- 2. How can you identify corresponding parts in congruent triangles?*
- 3. What does SSS and SAS represent and when do you use them?*
- 4. When writing a proof why start off with a plan and what should this plan look like?*

Assignment: pg 208: 1-25

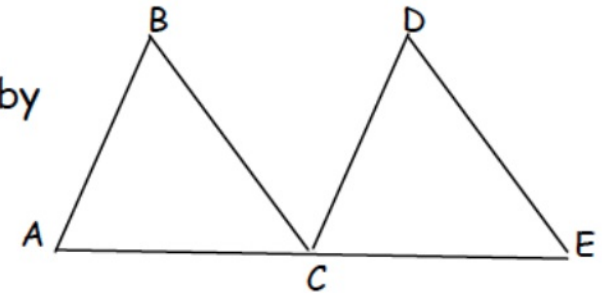
Agenda:
Warm Up:

Write a congruence statement between triangles and state the postulate implied. If you cannot apply a postulate, write "no conclusion can be made."



3. Assume that $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{DE}$. What additional Information would you need to prove that $\triangle ABC \cong \triangle CDE$ by SSS? _____

4. Assume that $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{DE}$. What additional Information would you need to prove that $\triangle ABC \cong \triangle CDE$ by SAS? _____



Check Hmk: pg 208: 1-25

4-3 Triangle Congruence by ASA and AAS

Assignment: pg 215: 1-5, 8, 9, 13-16, 33-35, 37, 38

Proving Triangles Congruent HSG-CO.B.8

Goal: I can prove triangles congruent using the postulate and theorems SSS, SAS, ASA, AAS, and HL.

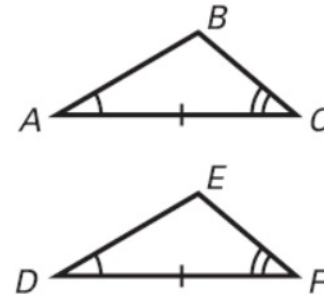
Essential Questions:

1. How do you write a triangle congruence statement?
2. How can you identify corresponding parts in congruent triangles?
3. What does ASA and AAS represent and when do you use them?
4. When writing a proof why start off with a plan and what should this plan look like?

ANGLE-SIDE-ANGLE (ASA) CONGRUENCE POSTULATE

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

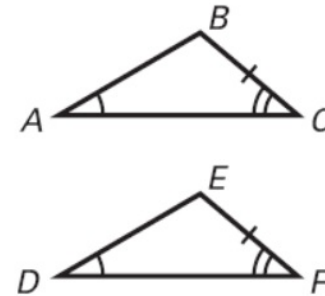
If Angle $\angle A \cong$ _____,
Side $\overline{AC} \cong$ _____, and
Angle $\angle C \cong$ _____,
then $\triangle ABC \cong$ _____.



ANGLE-ANGLE-SIDE (AAS) CONGRUENCE THEOREM

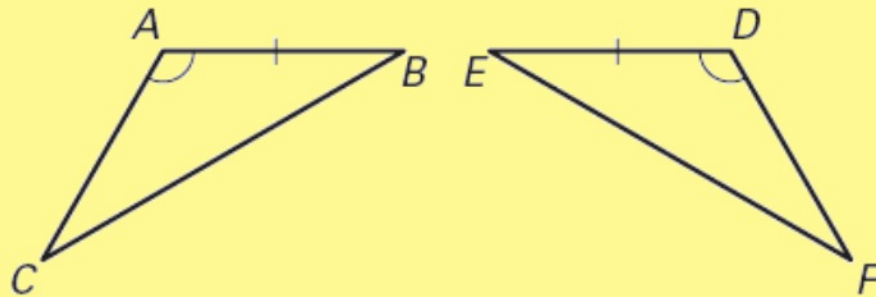
If two angles and a nonincluded side of one triangle are congruent to two angles and the corresponding nonincluded side of a second triangle, then the two triangles are congruent.

If Angle $\angle A \cong$ _____,
Angle $\angle C \cong$ _____, and
Side _____ \cong _____,
then $\triangle ABC \cong$ _____.

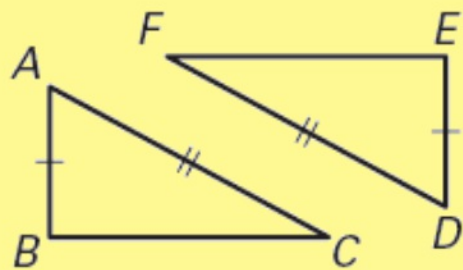


State the third congruence that must be given to prove that $\triangle ABC \cong \triangle DEF$ using the indicated postulate or theorem.

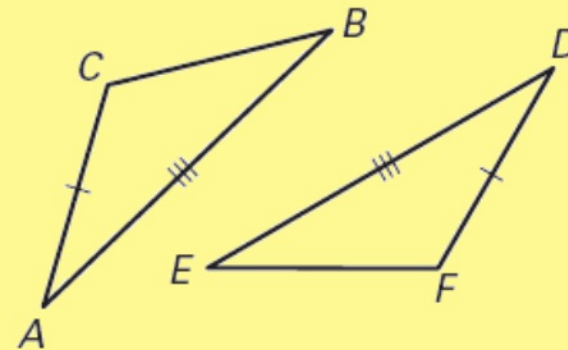
AAS Congruence Theorem



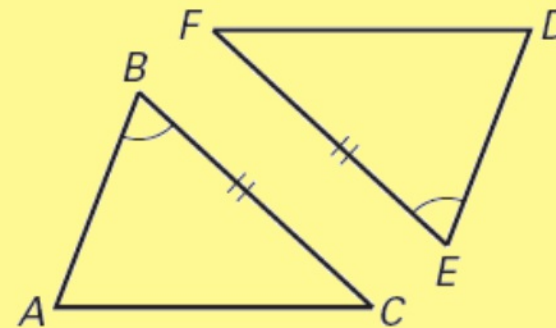
SAS Congruence Postulate



SSS Congruence Postulate



ASA Congruence Postulate



$$\overline{BC} \cong \overline{EF}$$

$$\angle C \cong \angle F$$

$$\angle C \cong \angle F$$

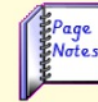
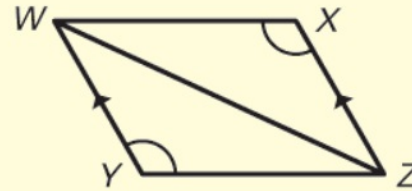
$$\angle A \cong \angle D$$

\triangle \triangle

Practice

Given: $\overline{WY} \parallel \overline{XZ}$, $\angle Y \cong \angle X$

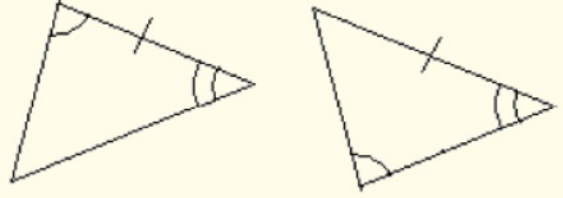
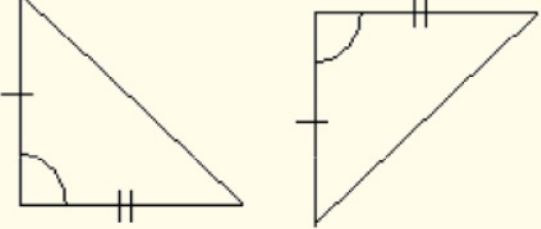
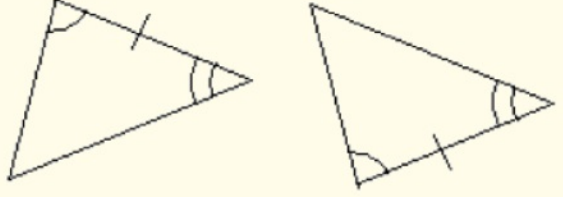
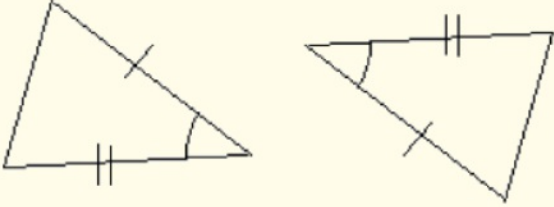
Prove: $\triangle WYZ \cong \triangle ZXW$



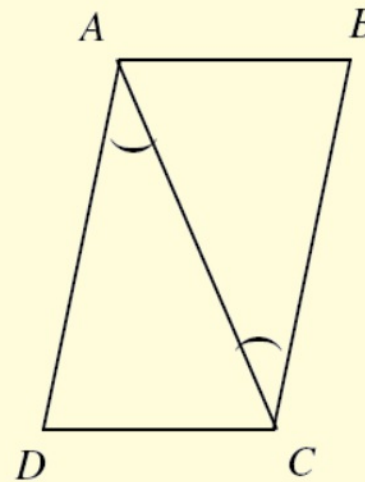
Plan for Proof You are given that $\angle Y \cong \angle X$. Use the fact that $\overline{WY} \parallel \overline{XZ}$ to identify a pair of congruent angles.

	Statement	Reason
1.	$\underline{\hspace{2cm}} \cong \underline{\hspace{2cm}}, \underline{\hspace{2cm}} \parallel \underline{\hspace{2cm}}$	1. Given
2.	$\underline{\hspace{2cm}} \cong \underline{\hspace{2cm}}$	2. Alternate Interior Angles Theorem
3.	$\underline{\hspace{2cm}} \cong \underline{\hspace{2cm}}$	3. Reflexive Property of Congruence
4.	$\underline{\hspace{2cm}} \cong \underline{\hspace{2cm}}$	4. <div style="background-color: black; width: 100%; height: 20px;"></div>

In each pair of triangles, parts are congruent as marked. Which pair of triangles is congruent by ASA?

<p>A</p>	<p>B</p>
 <p>Two triangles are shown. The top triangle has a single tick mark on its right side and a single arc on its top angle. The bottom triangle has a single tick mark on its right side and a single arc on its bottom angle.</p>	 <p>Two right triangles are shown. The left triangle has a single tick mark on its left vertical leg and a double tick mark on its bottom horizontal leg. The right triangle has a single tick mark on its left vertical leg and a double tick mark on its top horizontal leg.</p>
<p>C</p>	<p>D</p>
 <p>Two triangles are shown. The top triangle has a single tick mark on its right side, a single arc on its top angle, and a double arc on its bottom angle. The bottom triangle has a single tick mark on its right side, a single arc on its bottom angle, and a double arc on its top angle.</p>	 <p>Two triangles are shown. The left triangle has a single tick mark on its top side, a double tick mark on its bottom side, and a single arc on its bottom angle. The right triangle has a single tick mark on its bottom side, a double tick mark on its top side, and a single arc on its top angle.</p>

What else must you know to prove the triangles congruent by ASA? By SAS?



A $\angle ACD \cong \angle CAB; \overline{AB} \cong \overline{CD}$

B $\angle ADC \cong \angle CAB; \overline{AD} \cong \overline{BC}$

C $\angle ACD \cong \angle CAB; \overline{AD} \cong \overline{BC}$

D $\angle ACD \cong \angle CAB; \overline{AD} \cong \overline{AC}$

Goal: I can prove triangles congruent using the postulate and theorems ASA, and AAS.

Essential Questions:

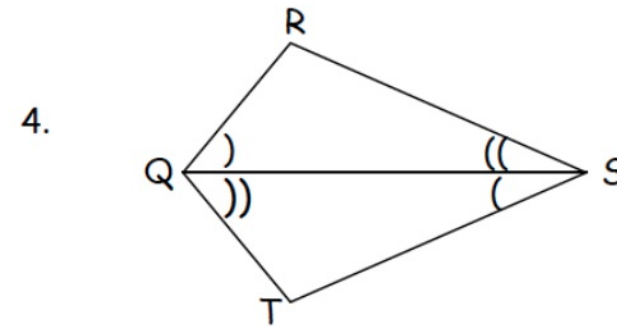
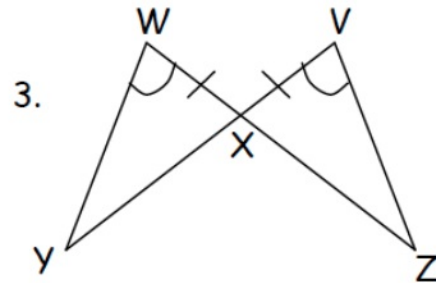
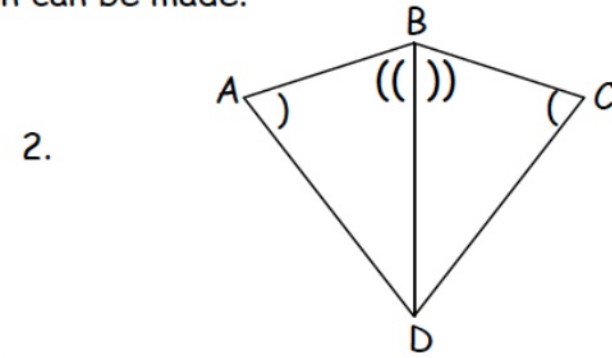
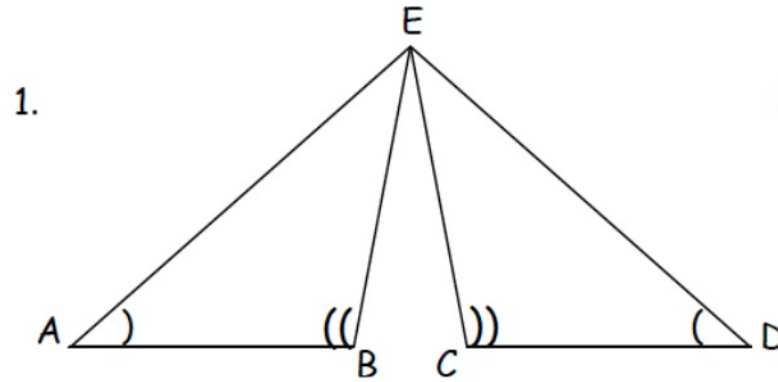
- 1. How do you write a triangle congruence statement?*
- 2. How can you identify corresponding parts in congruent triangles?*
- 3. What does ASA and AAS represent and when do you use them?*
- 4. When writing a proof why start off with a plan and what should this plan look like?*

Assignment:

pg 215: 1-5, 8, 9, 13-16, 33-35, 37, 38

Warm Up:

Write a congruence statement between triangles and state the postulate implied. If you cannot apply a postulate, write "no conclusion can be made."



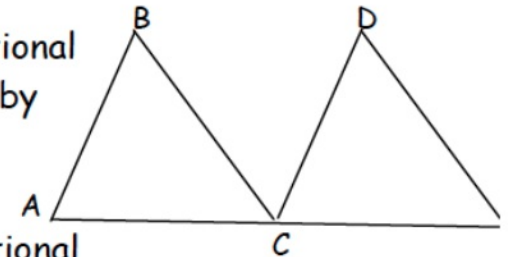
Chk Hmk: pg
215: 1-5, 8, 9,
13-16, 33-35, 37, 38

4-6 Congruence in Right Triangles

Assignment: pg 238:
1-8, 27-29 &
Handout

7. Assume that $\overline{AB} \cong \overline{CD}$ and $\angle BAC \cong \angle DCE$. What additional Information would you need to prove that $\triangle ABC \cong \triangle CDE$ by ASA? _____

8. Assume that $\angle ABC \cong \angle CDE$ and $\overline{BC} \cong \overline{DE}$. What additional Information would you need to prove that $\triangle ABC \cong \triangle CDE$ by AAS? _____



Proving Triangles Congruent HSG-SRT.B.5

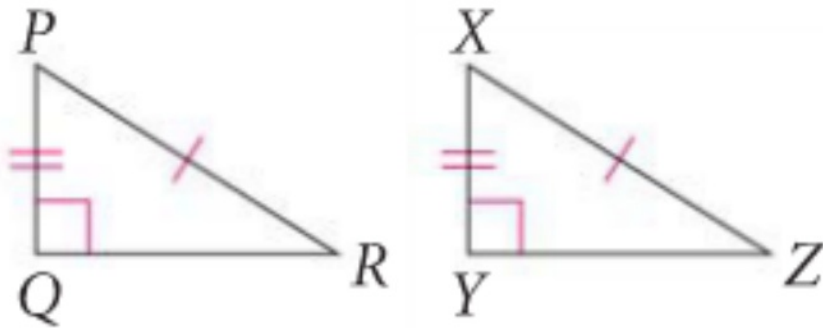
Goal: I can prove triangles congruent using the HL Thm.

Essential Questions:

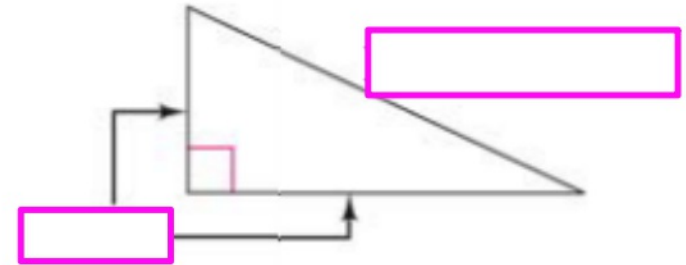
1. How do you write a triangle congruence statement?
2. How can you identify corresponding parts in congruent triangles?
3. What does HL Theorem represent and when do you use it?
4. When writing a proof why start off with a plan and what should this plan look like?

Hypotenuse-Leg (HL) Theorem

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



Parts of a Right Triangle



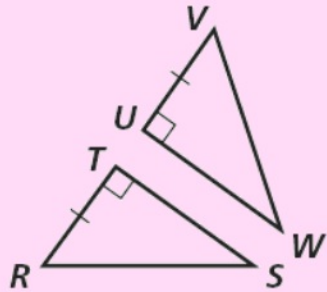
If $\triangle PQR$ and $\triangle XYZ$ are _____

$\overline{PR} \cong$ _____ and $\overline{PQ} \cong$ _____

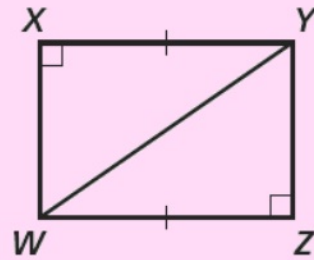
then $\triangle PQR \cong \triangle XYZ$

What additional information do you need to prove each pair of triangles congruent by the HL Theorem?

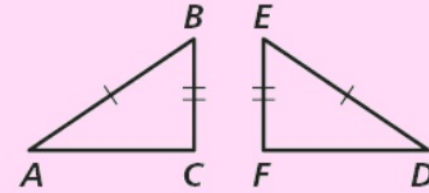
3. _____



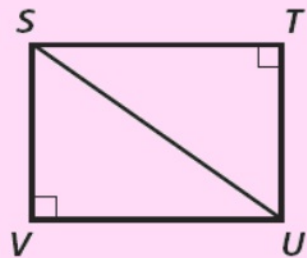
4. _____



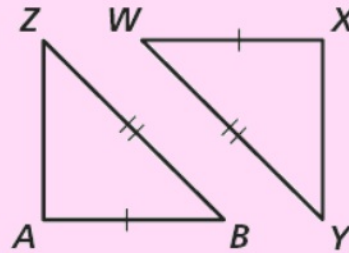
5. _____



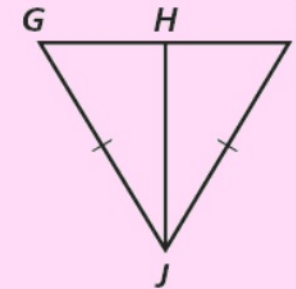
6. _____



7. _____



8. _____

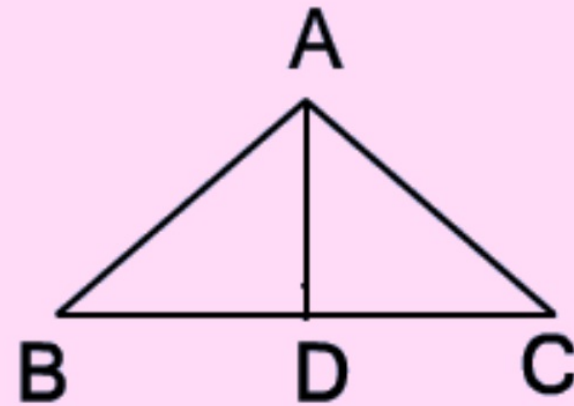


Complete the proof.

Given: $\overline{AD} \perp \overline{BC}$
 $\overline{BA} = \overline{AC}$

Prove: $\triangle ABD \cong \triangle ACD$

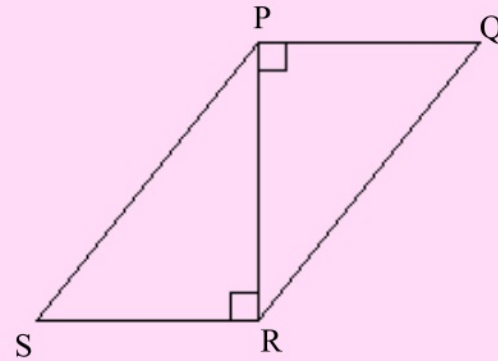
Proof



Statement	Reasons
1. $\angle ADB$ and $\angle ADC$ are right angles	1.
2. $\triangle ADB$ and $\triangle ADC$ are right triangles	2.
3. $\overline{BA} = \overline{AC}$	3.
4. $AD = AD$	4.
5. $\triangle ABD \cong \triangle ACD$	5.

1.) Given: $\angle PRS$ and $\angle RPQ$ are right angles, $SP \cong QR$

Prove: $\triangle PRS \cong \triangle RPQ$



Goal: I can prove triangles congruent using the HL Thm.

Essential Questions:

1. How do you write a triangle congruence statement?
2. How can you identify corresponding parts in congruent triangles?
3. What does HL Theorem represent and when do you use it?
4. When writing a proof why start off with a plan and what should this plan look like?

Assignment:

pg 238: 1-8, 27-29 & Handout