Geometry A | Name: ______________________________
4.4: Prove Triangles Congruent by H-L | Date: ____________________ Period: _______

- I can prove triangles congruent using H-L

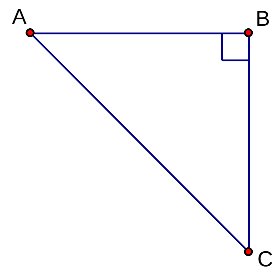
Vocabulary:

In a right triangle, the side opposite the right angle is called the _________________________.

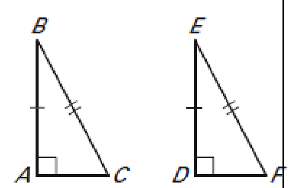
In a right triangle, the sides that form the right angle are called the ______________________.

In right triangle *ABC*, the hypotenuse is _________.

The legs are _________ and _________.



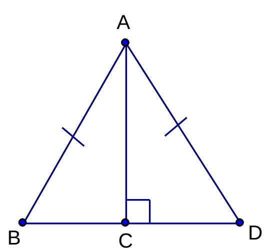
There is a special method for proving right triangles are congruent. This method only works for right triangles!

Hypotenuse – Leg Theorem (H-L)	**Example:**
If the hypotenuse and leg of one right triangle are congruent to the hypotenuse and leg of a second right triangle, then the two triangles are congruent.	If **Hypotenuse** $\overline{BC} \cong$ _______ and **Leg** $\overline{AB} \cong$ _______ in right triangles ΔABC *and* ΔDEF , then $\Delta ABC \cong$ _________ 

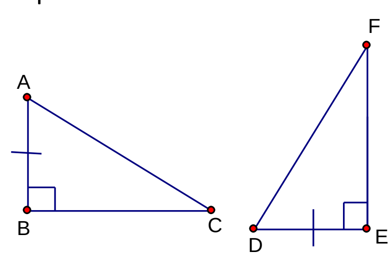
<u>Example 1: Using H-L to identify congruent triangles</u>

Can you prove the following triangles are congruent? Explain.

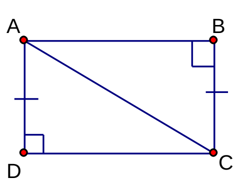
a.



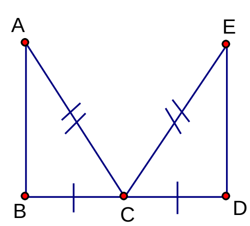
b.



c.



d.



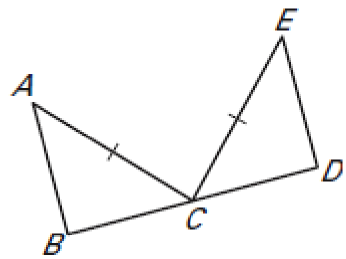
When writing a proof using H-L, it is important that you state the following three things in your explanation:

- **That the two triangles are right triangles.**
- **One pair of legs is congruent.**
- **The two hypotenuse are congruent.**

Example 2: Proofs involving H-L

a) **Given:** $\overline{AC} \cong \overline{EC}$; $\overline{AB} \perp \overline{BD}$; $\overline{ED} \perp \overline{BD}$;
$\overline{AC}$ *is a bisector of* $\overline{BD}$

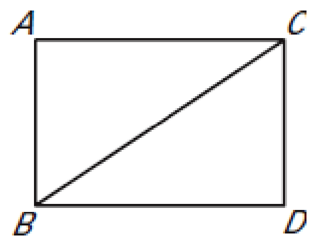
Prove: $\Delta ABC \cong \Delta EDC$



Statements	Reasons
1. $\overline{AC} \cong \overline{EC}$	**1.**
2. $\overline{AB} \perp \overline{BD}$; $\overline{ED} \perp \overline{BD}$	**2.**
3.	**3.**
4.	**4.**
5. $\overline{AC}$ is a bisector of $\overline{BD}$	**5.**
6. $\overline{BC} \cong$ ________	**6.**
7. $\Delta ABC \cong \Delta EDC$	**7.**

b) **Given:** $\overline{AB} \cong \overline{DC}$; $\overline{BA} \perp \overline{AC}$; $\overline{CD} \perp \overline{DB}$

Prove: $\Delta ABC \cong \Delta DCB$

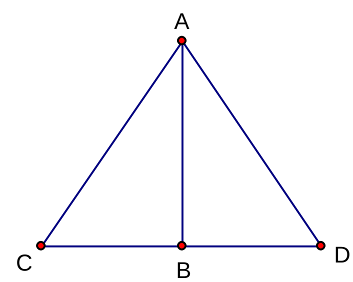


Statements	Reasons
1. $\overline{AB} \cong \overline{DC}$	**1.**
2. $\overline{BA} \perp \overline{AC}$; $\overline{CD} \perp \overline{DB}$	**2.**
3. $\angle A$ *and* $\angle D$ are ________________________	**3.**
4. ΔABC *and* ΔEDC are __________________________	**4.**
5. $\overline{CB} \cong \overline{CB}$	**5.**
6. $\Delta ABC \cong \Delta DCB$	**6.**

Does a right angle always mean we will use H-L? Let's see!

Given: $\overline{AB}$ is perpendicular bisector of $\overline{CD}$

Prove: $\Delta ABC \cong \Delta ABD$



Statements	Reasons
1. $\overline{AB}$ is perpendicular bisector of $\overline{CD}$	**1.**
2.	**2.** definition of perpendicular lines
3. $\angle ABC \cong \angle ABD$	**3.**
4. $\overline{BC} \cong$ __________	**4.**
5. $\overline{AB} \cong \overline{AB}$	**5.**
6. $\Delta ABC \cong \Delta ABD$	**6.**

Geometry A

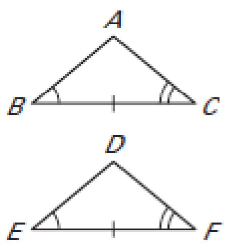
Homework: H-L

Name: ______________________________________

Date: ____________________ Period: ____________

Is it possible to prove that the triangles are congruent? If so, state the postulate or theorem you would use.

1.



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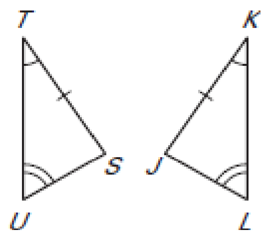

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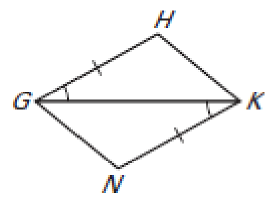

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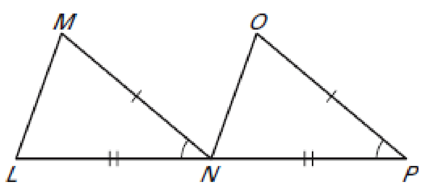

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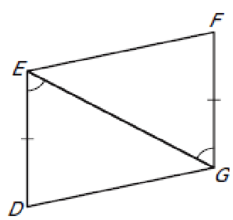
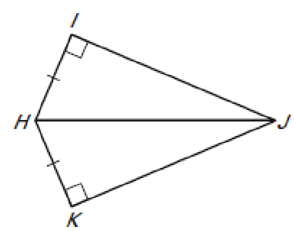


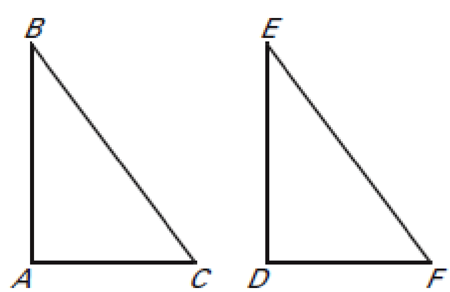
6.



State the third congruence that is needed to prove that ΔABC ≅ ΔXYZ using the given postulate or theorem.

7. GIVEN: $\angle B \cong \angle E$, $\overline{BC} \cong \overline{EF}$, ________ $\cong$ ________

Use the SAS Congruence Theorem



8. GIVEN: $\overline{AB} \cong \overline{DE}$, $\overline{BC} \cong \overline{EF}$, ________ $\cong$ ________

Use the SSS Congruence Postulate

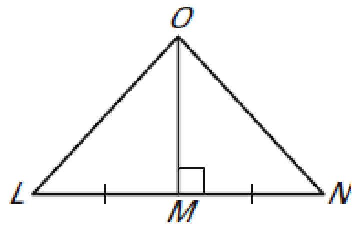
9. GIVEN: $\overline{AC} \cong \overline{DF}$, $\angle A$ *is a right angle and* $\angle A \cong \angle D$, _________ $\cong$ ________

Use the H-L Congruence Theorem

10. Complete the proof.

Given: $\overline{OM} \perp \overline{LN}$, $\overline{ML} \cong \overline{MN}$

Prove: $\Delta OML \cong \Delta OMN$

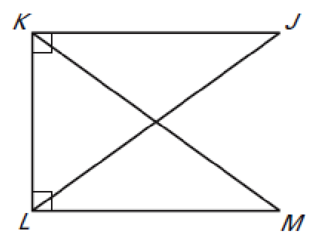


Statements	Reasons
1 $\overline{OM} \perp \overline{LN}$	1.
2. $\angle LMO$ *and* $\angle NMO$ are right angles	2. def. of ______________________
3. ΔLMO *and* ΔNMO are right triangles	3. Def. of ________________________
4. $\overline{ML} \cong \overline{MN}$	4.
5.	5. Reflexive Property
3. $\Delta OML \cong \Delta OMN$	6.

11. **Given:** $\angle$JKL & $\angle$ MLK are right angles

$\overline{JL} \cong \overline{MK}$

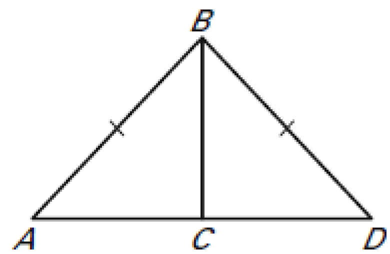
Prove: $\Delta JKL \cong \Delta MLK$



Statements	**Reasons**
1. $\angle JKL$ & $\angle MLK$ are right $\angle$s	**1.**
2. ΔJKL *and* ΔMLK are ______________________	**2.**
3. $\overline{JL} \cong \overline{MK}$	**3.**
4. $\overline{KL} \cong \overline{KL}$	**4.**
5. $\Delta JKL \cong \Delta MLK$	**5.**

12. **Given:** $\overline{AB} \cong \overline{DB}$, $\overline{BC} \perp \overline{AD}$

Prove: $\Delta ABC \cong \Delta DBC$



Statements	Reasons
1. $\overline{AB} \cong \overline{DB}$	**1.**
2. $\overline{BC} \perp \overline{AD}$	**2.**
3. $\angle BCA$ and $\angle BCD$ are ____________________	**3.**
4. ΔABC and ΔDBC are _____________________	**4.**
5. $\overline{CB} \cong \overline{CB}$	**5.**
6. $\Delta ABC \cong \Delta DCB$	**6.**

Answer Key:

1. Yes, by SAS
2. Yes, by AAS
3. Yes, by SAS
4. Yes, by SAS
5. Yes, by SAS
6. Yes, by H-L
7. $\overline{BA} \cong \overline{ED}$
8. $\overline{AC} \cong \overline{DF}$
9. $\overline{BC} \cong \overline{EF}$
10. 1) Given 2) Def of Perpendicular Lines 3) Def of right triangles 4) $\overline{OM} \cong \overline{OM}$ 5) SAS
11. 1) Given 2) Right triangles; Def of right triangles 3) Given 4) Reflexive Property 5) H-L
12. 1) Given 2) Given 3) Right angles; Def of perpendicular lines 4) Right triangles; Def of right triangles 5) Reflexive Property 6) H-L