Geometry A
4.4: Prove Triangles Congruent by H-L

Name: Key
Date: ____________ Period: ______

LEARNING TARGETS

- I can prove triangles congruent using H-L

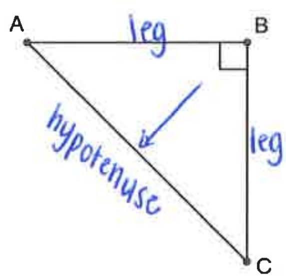
Vocabulary:

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

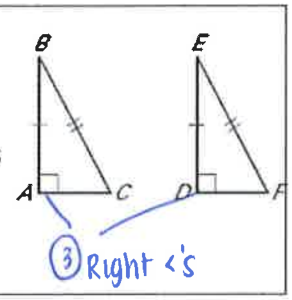
In a right triangle, the sides that form the right angle are called the legs.

In right triangle *ABC*, the hypotenuse is $\overline{AC}$.

The legs are $\overline{AB}$ and $\overline{BC}$.



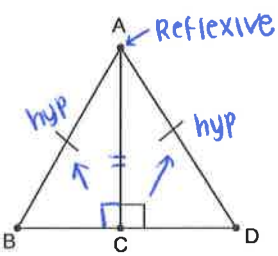
There is a special method for proving right triangles are congruent. This method only works for right triangles!

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.	① If **Hypotenuse** $\overline{BC} \cong$ $\overline{EF}$ ② and **Leg** $\overline{AB} \cong$ $\overline{DE}$ in right triangles ΔABC and ΔDEF, then $\Delta ABC \cong$ ΔDEF by H-L  ③ Right <'s

Example 1: Using H-L to identify congruent triangles

Can you prove the following triangles are congruent? Explain.

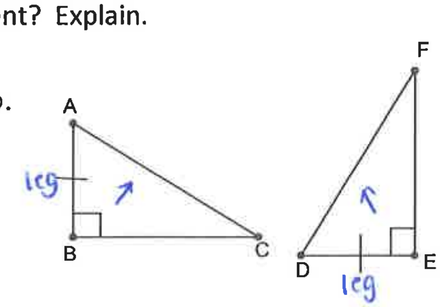
a.



Yes, by H-L

right <'s ✓ Leg ✓
hyp ✓

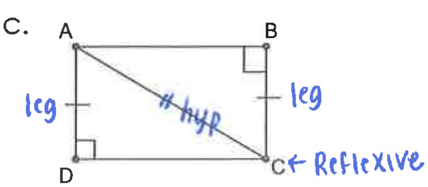
b.



right <'s ✓
hyp : not marked
leg ✓

not enough info to prove ≅

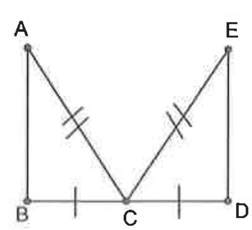
c.



right <'s ✓
hyp ✓
leg ✓

Yes, $\Delta ADC \cong \Delta ABC$ by HL

d.



right <'s : not marked
hyp : If no right <, no hyp
leg : ✓

not enough info to prove ≅

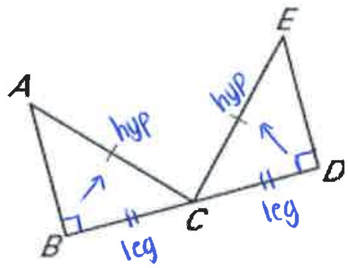
When writing a proof using H-L, it is important that you state the following three things in your explanation:

- **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: $\triangle ABC \cong \triangle EDC$

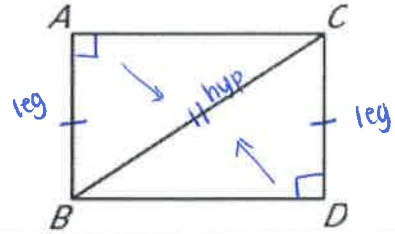


Statements	Reasons
1. $\overline{AC} \cong \overline{EC}$	**1.** Given
2. $\overline{AB} \perp \overline{BD}$; $\overline{ED} \perp \overline{BD}$	**2.** Given
3. $\angle B$ and $\angle D$ are right $\angle$'s	**3.** Def of $\perp$ lines
4. $\triangle ABC$ ⁝ $\triangle EDC$ are right $\triangle$'s	**4.** Def of right $\triangle$'s
5. $\overline{AC}$ is a bisector of $\overline{BD}$	**5.** Given
6. $\overline{BC} \cong$ $\overline{DC}$	**6.** Def of segment bisector
7. $\triangle ABC \cong \triangle EDC$	**7.** H-L

Right $\angle$'s: ✓
hyp: ✓
leg: ✓

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

Prove: $\triangle ABC \cong \triangle DCB$



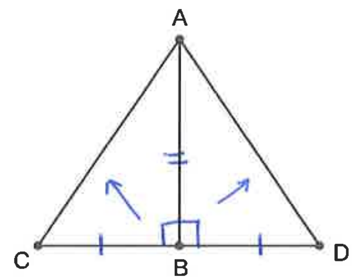
Statements	Reasons
1. $\overline{AB} \cong \overline{DC}$	**1.** Given
2. $\overline{BA} \perp \overline{AC}; \overline{CD} \perp \overline{DB}$	**2.** Given
3. $\angle A$ and $\angle D$ are right <'s	**3.** Def of ⊥ lines
4. $\triangle ABC$ and $\triangle EDC$ are right Δ's	**4.** Def of right Δ's
5. $\overline{CB} \cong \overline{CB}$	**5.** Reflexive Prop
6. $\triangle ABC \cong \triangle DCB$	**6.** HL

right <'s: ✓
hyp: ✓
leg: ✓

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

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

Prove: $\triangle ABC \cong \triangle ABD$



Statements	Reasons
1. $\overline{AB}$ is perpendicular bisector of $\overline{CD}$	**1.** Given
2. <ABC & <ABD are right <'s	**2.** definition of perpendicular lines
3. $\angle ABC \cong \angle ABD$	**3.** all right angles are ≅
4. $\overline{BC} \cong$ $\overline{BD}$	**4.** Def of ⊥ bisector
5. $\overline{AB} \cong \overline{AB}$	**5.** Reflexive prop
6. $\triangle ABC \cong \triangle ABD$	**6.** SAS

right <'s: ✓
hyp: not marked
leg: ✓

} cant use HL