

HSG.CO.B.7

Goals: I can identify congruent overlapping triangles and prove triangles congruent by first proving two other triangles congruent.

Essential Questions:

1.) Describe how to identify congruent overlapping triangles?

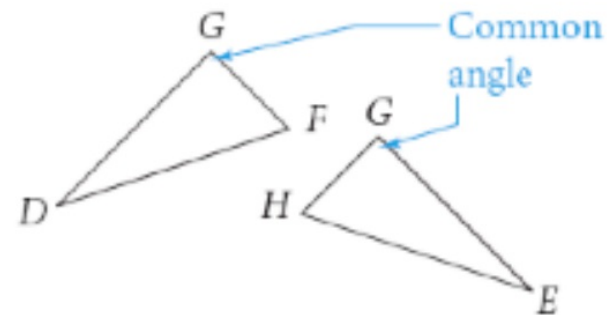
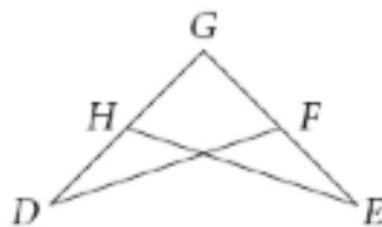
2.) Why is it beneficial to separate overlapping triangles?

3.) Compare and contrast the proofs we did in class today to those we did prior to today. What are the similarities and differences?

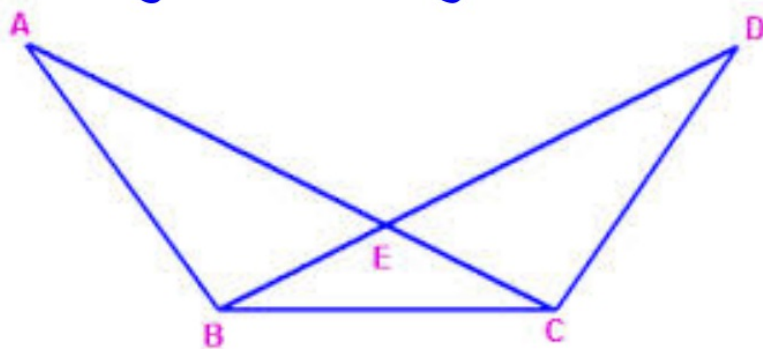
Overlapping triangles share part or all of one or more sides.

Some triangle relationships are difficult to see because the triangles overlap.

Overlapping triangles may have a common side or angle. You can simplify your work with overlapping triangles by separating and redrawing the triangles.



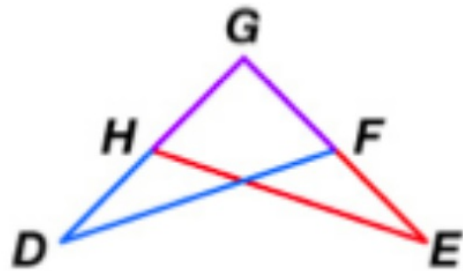
Separate the triangles and identify common angles or sides.



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1 EXAMPLE

Name the parts of their sides that $\triangle DFG$ and $\triangle EHG$ share.



Identify the overlapping triangles.

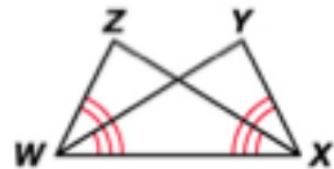
Parts of sides \overline{DG} and \overline{EG} are shared by \triangle _____ and \triangle _____

These parts are _____ and _____ respectively.

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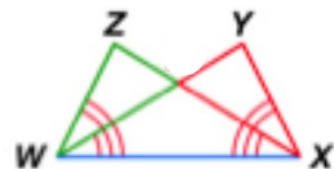
Planning a Proof

2 EXAMPLE Write a Plan for Proof that does not use overlapping triangles.



Given: $\angle ZWX \cong \angle YWX$, $\angle ZWX \cong \angle YWX$

Prove: $\overline{ZW} \cong \overline{YX}$



Label point **M** where \overline{ZX} intersects \overline{WY} , as shown in the diagram. $\overline{ZW} \cong \overline{YX}$ by CPCTC if $\triangle ZWM \cong \triangle YXM$.

You can prove these triangles congruent using ASA as follows:

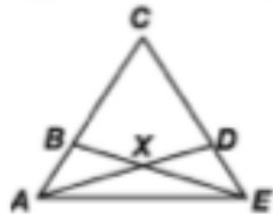
Look at $\triangle MWX$. $\overline{MW} \cong \overline{MX}$ by the Converse of the _____

Look again at $\triangle ZWM$ and $\triangle YXM$. $\angle ZMW \cong \angle YMX$ because _____ are _____, $\overline{MW} \cong \overline{MX}$, and by subtraction $\angle ZWM \cong \angle YXM$, so $\triangle ZWM \cong \triangle YXM$ by _____

Fill in the missing reasons.

Separating Overlapping Triangles

4 EXAMPLE



Given: $\overline{CA} \cong \overline{CE}$, $\overline{BA} \cong \overline{DE}$

Write a two-column proof to show that $\angle CBE \cong \angle CDA$.

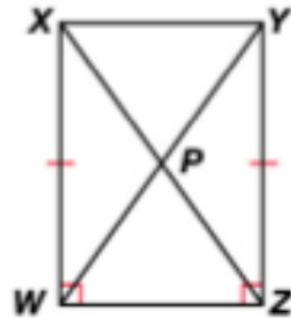
Plan: $\angle CBE \cong \angle CDA$ by CPCTC if $\triangle CBE \cong \triangle CDA$. This congruence holds by SAS if $\overline{CB} \cong \overline{CD}$.

Statements	Reasons
1. $\angle BCE \cong \angle DCA$	
2. $\overline{CA} \cong \overline{CE}$, $\overline{BA} \cong \overline{DE}$	
3. $CA = CE$, $BA = DE$	
4. $CA - BA = CE - DE$	
5. $CA - BA = CB$, $CE - DE = CD$	
6. $CB = CD$	
7. $\overline{CB} \cong \overline{CD}$	
8. $\triangle CBE \cong \triangle CDA$	
9. $\angle CBE \cong \angle CDA$	

Using Two Pairs of Triangles

3 EXAMPLE

Write a paragraph proof.



Given: $\overline{XW} \cong \overline{YZ}$, $\angle XWZ$ and $\angle YZW$ are right angles.

Prove: $\triangle XPW \cong \triangle YPZ$

Plan: $\triangle XPW \cong \triangle YPZ$ by AAS if $\angle WXZ \cong \angle ZYW$. These angles are congruent by CPCTC if $\triangle XWZ \cong \triangle YZW$.

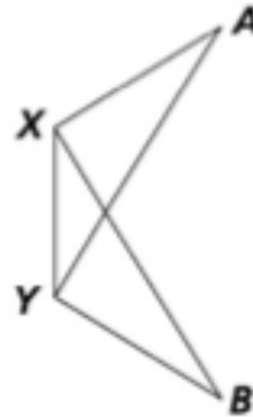
These triangles are congruent by SAS.

Statements

Reasons

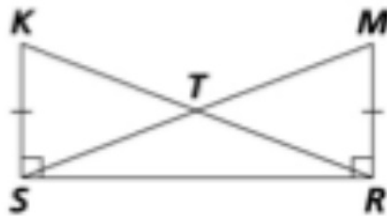
Check Point Questions:

1. Identify any common sides and angles in $\triangle AXY$ and $\triangle BYX$.

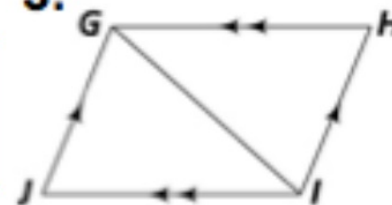


For Exercises 2 and 3, name a pair of congruent overlapping triangles. State the theorem or postulate that proves them congruent.

2.



3.

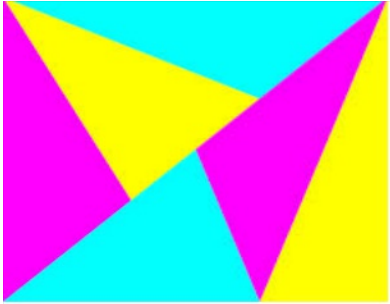


4. Plan a proof.

Given: $\overline{AC} \cong \overline{BD}$, $\overline{AD} \cong \overline{BC}$

Prove: $\overline{XD} \cong \overline{XC}$





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Assignment P4-7 handout

Review pages 249: 1-33 and page 190: 22-28