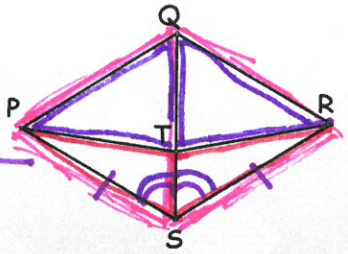
Together

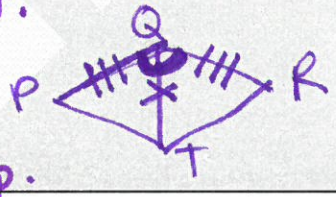
A tougher CPCTC problem

Complete a 2-column proof for....

2) Given: $\overline{PS} \cong \overline{RS}$, $\angle PSQ \cong \angle RSQ$
Prove: $\triangle QPT \cong \triangle QRT$



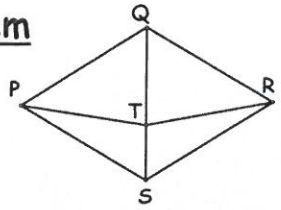
1) $\overline{PS} \cong \overline{RS}$, $\angle PSQ \cong \angle RSQ$	1) Given
2) $\overline{SQ} \cong \overline{SQ}$	2) Refl. Prop.
3) $\triangle PSQ \cong \triangle RSQ$	3) SAS Post.
4) $\overline{PQ} \cong \overline{RQ}$, $\angle PQT \cong \angle RQT$	4) CPCTC
5) $\overline{QT} \cong \overline{QT}$	5) Refl. Prop.
6) $\triangle PQT \cong \triangle RQT$	6) SAS Post.



The tiny red $\triangle$s would only give 1 part + $\cong$ towards the overall goal $\triangle$s, BUT the larger pink $\triangle$s $\triangle QSP$ and $\triangle QSR$ would give segments $\cong$ on top AND angles $\cong$ at Q

Answer to tougher CPCTC problem

2) Given: $\overline{PS} \cong \overline{RS}$, $\angle PSQ \cong \angle RSQ$
Prove: $\triangle QPT \cong \triangle QRT$

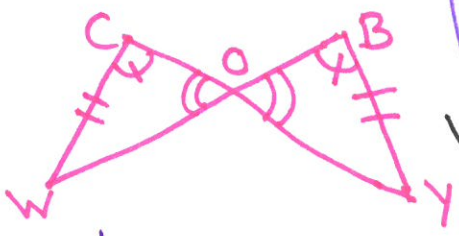


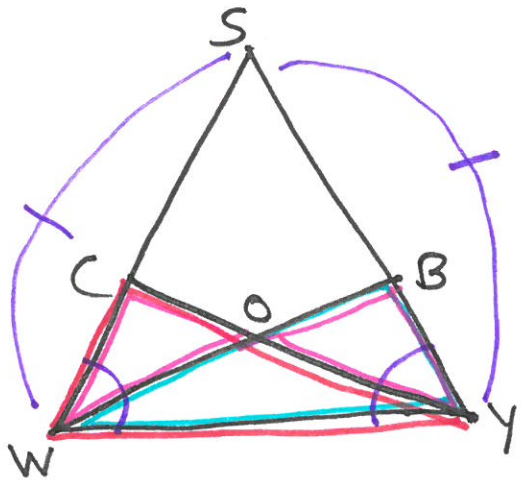
Statement	Reason
$\overline{PS} \cong \overline{RS}$, $\angle PSQ \cong \angle RSQ$	Given
$\overline{SQ} \cong \overline{SQ}$	Reflexive property of congr.
$\triangle PSQ \cong \triangle RSQ$	SAS Post.
$\overline{PQ} \cong \overline{RQ}$ and $\angle PQS \cong \angle RQS$	CPCTC
$\overline{QT} \cong \overline{QT}$	Reflexive property of congr.
$\triangle QPT \cong \triangle QRT$	SAS Post.

Together

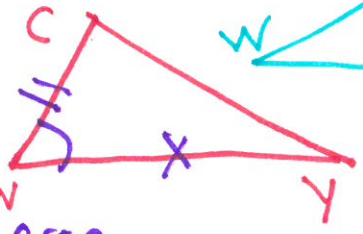
B) Given: $\overline{WS} \cong \overline{YS}$, $\overline{WC} \cong \overline{YB}$

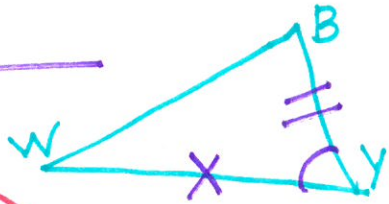
Prove: $\overline{CO} \cong \overline{BO}$





1) $\overline{WS} \cong \overline{YS}$, $\overline{WC} \cong \overline{YB}$	1) Given
2) $\overline{WY} \cong \overline{YW}$	2) Reflexive Prop.
3) $\angle CWY \cong \angle BYW$	3) Base angles of isosceles triangles are $\cong$
4) $\triangle CWY \cong \triangle BYW$	4) SAS $\cong$ Postulate
5) $\angle WCY \cong \angle YBW$	5) CPCTC
6) $\angle COW \cong \angle BOY$	6) Vertical $\angle$s are $\cong$
7) $\triangle COW \cong \triangle BOY$	7) AAS $\cong$ Theorem
8) $\overline{CO} \cong \overline{BO}$	8) CPCTC



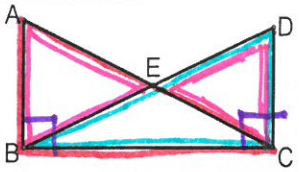


You Try 3)

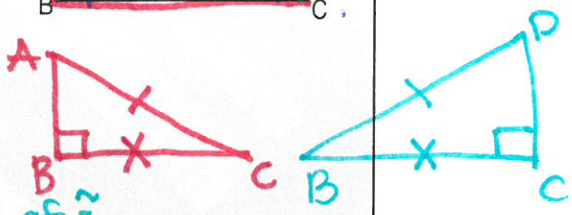
Practice Proof – tougher one using CPCTC

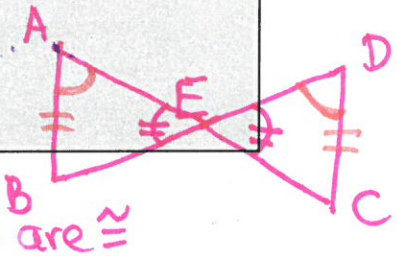
Given: $\overline{AB} \perp \overline{BC}$, $\overline{DC} \perp \overline{BC}$, $\overline{AC} \cong \overline{DB}$

Prove: $\overline{AE} \cong \overline{DE}$



1) $\overline{AB} \perp \overline{BC}$, $\overline{DC} \perp \overline{BC}$, $\overline{AC} \cong \overline{DB}$	1) Given
2) $\overline{BC} \cong \overline{CB}$	2) Reflexive Prop. of $\cong$
3) $\angle ABC$ and $\angle DCB$ are right $\angle$s	3) Definition of $\perp$ lines
4) $\triangle ABC \cong \triangle DCB$	4) HL Theorem
5) $\angle A \cong \angle D$ and $\overline{AB} \cong \overline{DC}$	5) CPCTC
6) $\angle AEB \cong \angle DEC$	6) Vertical $\angle$s are $\cong$
7) $\triangle AEB \cong \triangle DEC$	7) AAS $\cong$ Theorem
8) $\overline{AE} \cong \overline{DE}$	8) CPCTC

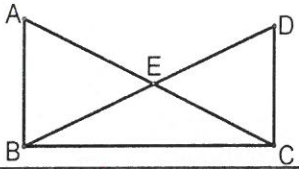




Practice Proofs – tougher one using CPCTC

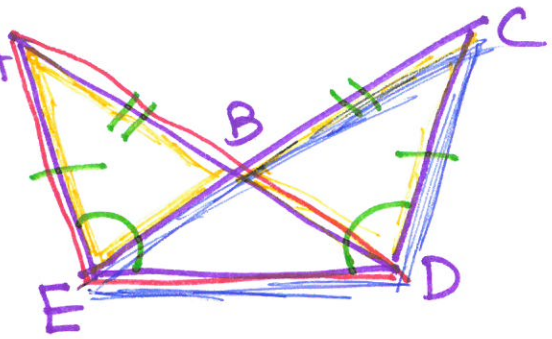
Given: $\overline{AB} \perp \overline{BC}$, $\overline{DC} \perp \overline{BC}$, $\overline{AC} \cong \overline{DB}$

Prove: $\overline{AE} \cong \overline{DE}$



Statement	Reason
$\overline{AB} \perp \overline{BC}, \overline{DC} \perp \overline{BC}, \overline{AC} \cong \overline{DB}$	Given
$\angle$ABC and $\angle$DCB are Right Angles	Defn. of perpendicular
ΔABC and ΔDCB are Right Δs	Defn. of Right Triangle
$\overline{BC} \cong \overline{BC}$	Reflexive Property of $\cong$
$\Delta ABC \cong \Delta DCB$	HL Theorem
$\overline{AB} \cong \overline{DC}$ and $\angle A \cong \angle D$	CPCTC
$\angle AEB \cong \angle DEC$	Vertical angles Theorem
$\Delta AEB \cong \Delta DEC$	AAS Theorem
$\overline{AE} \cong \overline{DE}$	CPCTC

7)

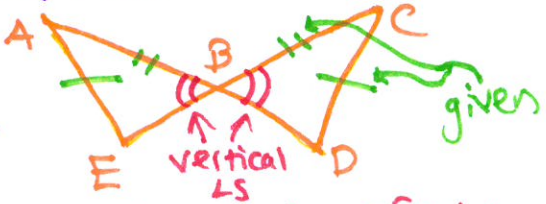


You Try

Given: $\angle AED \cong \angle CDE$,
$\overline{AB} \cong \overline{CB}$,
$\overline{AE} \cong \overline{CD}$

Prove: $\triangle ABE \cong \triangle CBD$

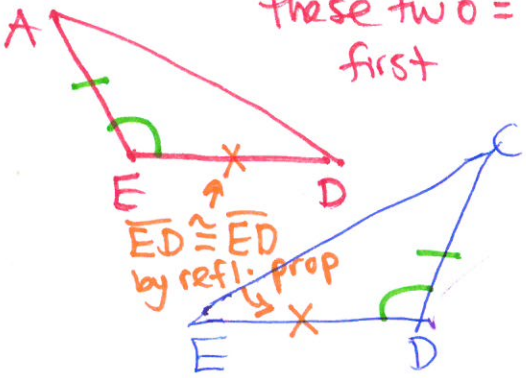
1st PLAN



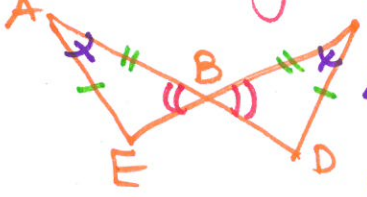
*Not enough info to show these $\triangle$s $\cong$ (SSA not a $\cong$ postulate)

So...

*Need to prove these two $\cong$ first



then use CPCTC to get parts from these $\triangle$s that will give an $\angle$ or side $\cong$ in our goal $\triangle$s



$\angle A \cong \angle C$ by CPCTC

2nd Do Proof

1) $\angle AED \cong \angle CDE$, $\overline{AB} \cong \overline{CB}$, $\overline{AE} \cong \overline{CD}$	1) Given
2) $\overline{ED} \cong \overline{ED}$ (or $\overline{ED} \cong \overline{DE}$)	2) Reflexive Property
3) $\triangle AED \cong \triangle CDE$	3) SAS $\cong$ Postulate
4) $\angle A \cong \angle C$	4) CPCTC
5) $\angle ABE \cong \angle CBD$	5) Vertical Angles are $\cong$
6) $\triangle ABE \cong \triangle CBD$	6) SAS $\cong$ Postulate (or AAS $\cong$ Thm. even without vertical angles) (or ASA $\cong$ Post.)

Name _____ Class _____ Date _____

Reteaching 4-7

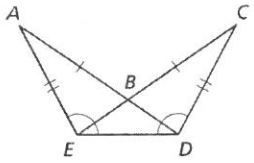
Use Corresponding Parts of Congruent Triangles

OBJECTIVE: Proving triangles congruent by first proving two other triangles congruent

MATERIALS: None

Sometimes you can prove one pair of triangles congruent and then use corresponding parts of those triangles to prove another pair congruent.

Example



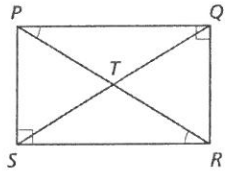
Write a paragraph proof.

Given: $\overline{AB} \cong \overline{CB}$, $\overline{AE} \cong \overline{CD}$, $\angle AED \cong \angle CDE$

Prove: $\triangle ABE \cong \triangle CBD$

$\overline{ED} \cong \overline{ED}$ by the Reflexive Property of $\cong$. It is given that $\overline{AE} \cong \overline{CD}$ and $\triangle AED \cong \triangle CDE$. Therefore, $\triangle AED \cong \triangle CDE$ by the SAS Postulate. $\angle A \cong \angle C$ by CPCTC. It is given that $\overline{AB} \cong \overline{CB}$. Therefore, $\triangle ABE \cong \triangle CBD$ by the SAS Postulate.

Exercises



Use the Plan for Proof to write a two-column proof.

1. Given: $\angle PSR$ and $\angle PQR$ are right angles, $\angle QPR \cong \angle SRP$

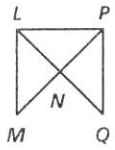
   Prove: $\triangle STR \cong \triangle QTP$

   Plan for Proof: Prove $\triangle QPR \cong \triangle SRP$ by the AAS Theorem. Then use CPCTC and vertical angles to prove $\triangle STR \cong \triangle QTP$ by the AAS Theorem.

Write a Plan for Proof.

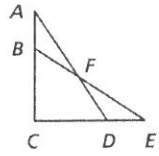
2. Given: $\angle MLP \cong \angle QPL$, $\angle M \cong \angle Q$

   Prove: $\triangle MLN \cong \triangle QPN$



3. Given: $\overline{AB} \cong \overline{ED}$, $\overline{BC} \cong \overline{DC}$

   Prove: $\triangle ABF \cong \triangle EDF$



Reteaching 4-7

1.

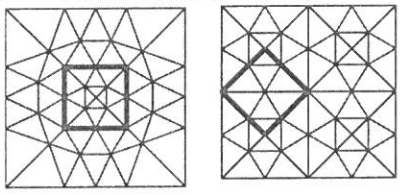
Statements	*Reasons*
1. $\angle PSR$ and $\angle PQR$ are right $\angle$s; $\angle QPR$ and $\angle SRP$	**1.** Given
2. $\angle PSR$ and $\angle PQR$	**2.** Right $\angle$s are congruent.
3. $\overline{PR} \cong \overline{PR}$	**3.** Reflexive Property of $\cong$
4. $\triangle QPR \cong \triangle SRP$	**4.** AAS Theorem
5. $\angle STR \cong \angle QTP$	**5.** Vertical $\angle$s are $\cong$.
6. $\overline{PQ} \cong \overline{RS}$	**6.** CPCTC
7. $\triangle STR \cong \triangle QTP$	**7.** AAS Theorem

2. Sample: Prove $\triangle MLP \cong \triangle QPL$ by the AAS Theorem. Then use CPCTC and vertical angles to show $\triangle MLN \cong \triangle QPN$ by the AAS Theorem. **3.** Sample: Prove $\triangle ACD \cong \triangle ECB$ by the SAS Postulate. Then use CPCTC and vertical angles to show $\triangle ABF \cong \triangle EDF$ by the AAS Theorem.

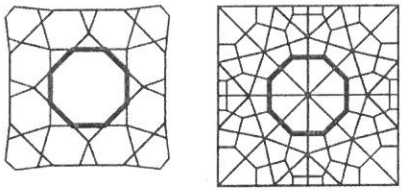
Enrichment 4-1

Check students' work. Samples shown.

1.



2.



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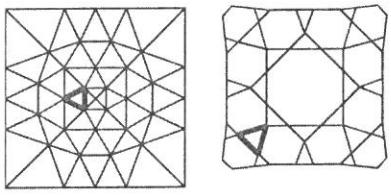

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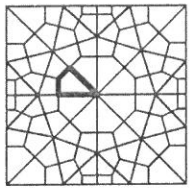
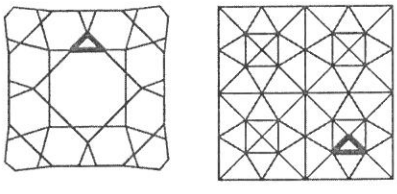


5.



Enrichment 4-2

1a. Definition of perpendicular lines **1b.** $\angle AKF \cong \angle GEL$ **1c.** SAS **2a.** Segment Addition Postulate **2b.** $\overline{LR} + \overline{RG} = \overline{TF} + \overline{TA}$ **2c.** $\overline{RG} \cong \overline{TA}$ **2d.** Alternate Interior Angles **2e.** Corresponding Angles **2f.** $\angle DAT \cong \angle JGR$ **2g.** SAS

Enrichment 4-3

1.–11. Check students' work. **2a.** ASA **2b.** The top angles are congruent because the fold bisected the right angles formed by the folds in steps 1 and 3. The corners of the paper are right angles; therefore, those angles are congruent. The included sides are congruent because the fold in step 1 found the midpoint of the width of the paper, thus creating two equal segments. **3a.** ASA **3b.** The top angles are congruent because the fold bisected the right angles formed by the folds in steps 1 and 2. The upper corners that became inside angles along the center line are right angles; therefore, those angles are congruent. The included sides are congruent because the fold in step 1 found the midpoint of the width of the paper, thus creating two equal segments. **4a.** The top angles are congruent because the fold bisected the right angles formed by the fold in step 1. The inside angles along the center line are right angles because the horizontal fold that formed them is perpendicular to the original fold in step 1. **4b.** The included sides are congruent because the fold in step 1 found the midpoint of the width of the paper, thus creating two equal segments. **8a.** ASA **8b.** The top angles are congruent because the fold bisected the right angles formed by the fold in step 7. The inside angles along the center line are congruent because of the Angle Addition Postulate. The included sides are congruent because the fold in step 7 found the midpoint of the width of the paper, thus creating two equal segments.

Enrichment 4-4

1. ABT **2.** ACT **3.** 45; 45; ABT; ACT **4.** 30; 30; ATB; ATC **5.** Reflexive Property of $\cong$ **6.** AAS Theorem **7.** CPCTC **8.** Definition of $\cong$ segments **9.** Definition of $\cong$ segments **10.** Definition of $\cong$ segments **11.** SSS Postulate **12.** CPCTC **13.** 60

Enrichment 4-5

1. 60	**2.** 60	**3.** 60	**4.** 70	**5.** 70	**6.** 40
7. 72	**8.** 72	**9.** 36	**10.** 30	**11.** 30	**12.** 120
13. 80	**14.** 80	**15.** 20	**16.** 80	**17.** 80	
18. 20	**19.** 41	**20.** 30	**21.** 109	**22.** 30	
23. 41	**24.** 109	**25.** 80	**26.** 80	**27.** 20	
28. 82	**29.** 82	**30.** 16	**31.** 75	**32.** 75	
33. 30	**34.** 40	**35.** 40	**36.** 100		