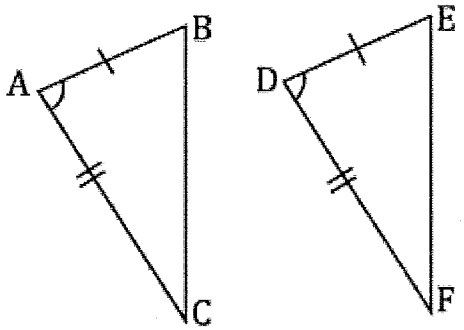
More Proofs Involving Congruent Triangles and Congruent Parts September 23 2014 (Tuesday)

In geometry, "Corresponding parts of congruent triangles are congruent" (**CPCTC**) is the abbreviation of a theorem regarding congruent triangles. **CPCTC** states that if two or more triangles are proven congruent by any method, then all of their corresponding angles and sides are congruent as well.

Ex. 1.

Given: $\overline{AB} \cong \overline{DE}$, $\angle A \cong \angle D$, and $\overline{AC} \cong \overline{DF}$

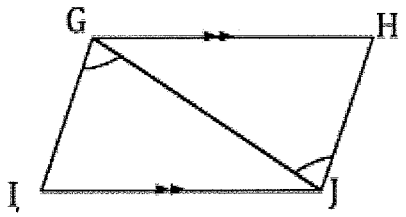


Prove: $\angle C \cong \angle F$

Statement	Reason
1)	
2)	
3)	
4)	
5)	

Ex. 2.

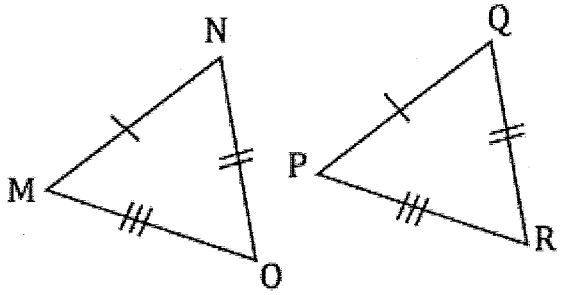
Given: $\overline{GH} \parallel \overline{IJ}$, $\angle IGJ \cong \angle HJG$



Prove: $\overline{IG} \cong \overline{HJ}$

Statement	Reason
1)	
2)	
3)	
4)	
5)	
6)	

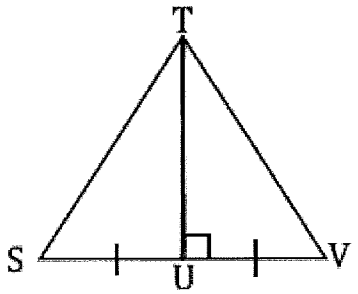
1. Given: $\overline{MN} \cong \overline{PQ}$, $\overline{NO} \cong \overline{QR}$, and $\overline{OM} \cong \overline{RP}$



Prove: $\angle M \cong \angle P$

Statement	Reason
1)	
2)	
3)	
4)	
5)	

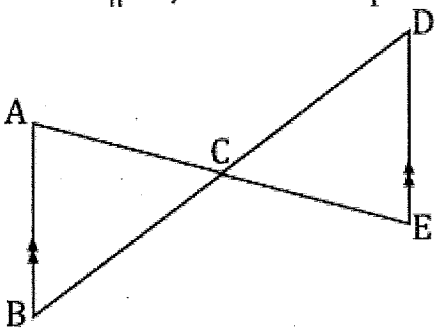
2. Given: $\overline{SU} \cong \overline{UV}$



Prove: $\overline{ST} \cong \overline{VT}$

Statement	Reason
1)	
2)	
3)	
4)	

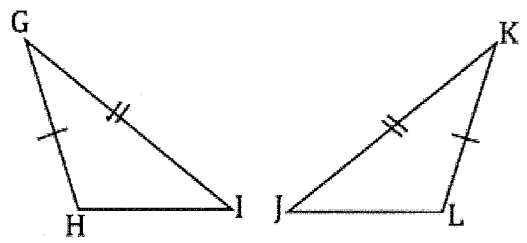
3. Given: $\overline{AB} \parallel \overline{DE}$, C is the midpoint of $\overline{AE}$



Prove: $\overline{BC} \cong \overline{DC}$

Statement	Reason
1)	
2)	
3)	
4)	
5)	
6)	
7)	

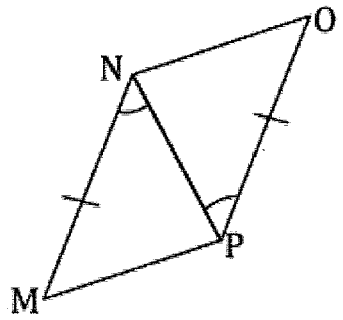
4. Given: $\overline{GH} \cong \overline{KL}$, $\angle G \cong \angle K$, and $\overline{GI} \cong \overline{KJ}$



Prove: $\overline{HI} \cong \overline{LJ}$

Statement	Reason
1)	
2)	
3)	
4)	
5)	

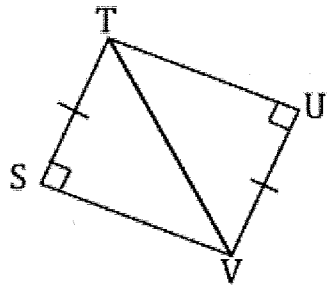
5. Given: $\angle MNP \cong \angle OPN$, and $\overline{MN} \cong \overline{OP}$



Prove: $\overline{MP} \cong \overline{NO}$

Statement	Reason
1)	
2)	
3)	
4)	
5)	

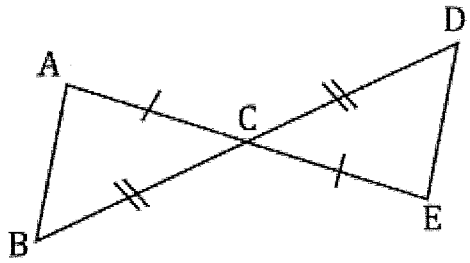
6. Given: $\overline{ST} \cong \overline{VU}$



Prove: $\angle SVT \cong \angle UTV$

Statement	Reason
1)	
2)	
3)	
4)	

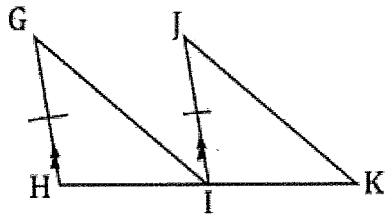
7. Given: $\overline{AC} \cong \overline{CE}$, $\overline{DC} \cong \overline{BC}$



Prove: $\angle B \cong \angle D$

Statement	Reason
1)	
2)	
3)	
4)	
5)	

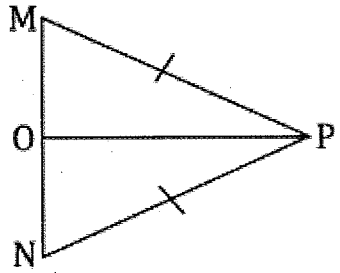
8. Given: $\overline{GH} \parallel \overline{JI}$, I is the midpoint of HK and $\overline{GH} \cong \overline{JI}$



Prove: $\angle G \cong \angle J$

Statement	Reason
1)	
2)	
3)	
4)	
5)	
6)	
7)	

9. Given: $\overline{MP} \cong \overline{NP}$, $\overline{MN} \perp \overline{OP}$



Prove: $\overline{MO} \cong \overline{ON}$

Statement	Reason
1)	
2)	
3)	
4)	
5)	

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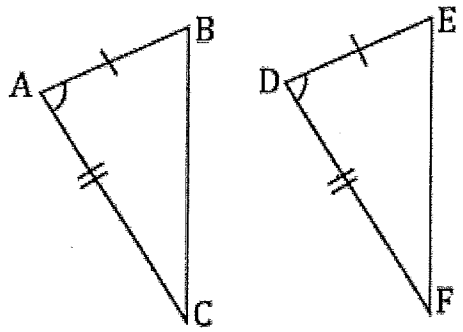
In geometry, "Corresponding parts of congruent triangles are congruent" (**CPCTC**) is the abbreviation of a theorem regarding congruent triangles. **CPCTC** states that if two or more triangles are proven congruent by any method, then all of their corresponding angles and sides are congruent as well.

Ex. 1.

Given: $\overline{AB} \cong \overline{DE}$, $\angle A \cong \angle D$, and $\overline{AC} \cong \overline{DF}$

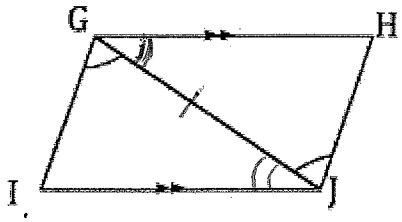


Prove: $\angle C \cong \angle F$

Statement	Reason
1) $\overline{AB} \cong \overline{DE}$	Given
2) $\angle A \cong \angle D$	Given
3) $\overline{AC} \cong \overline{DF}$	Given
4) $\triangle ABC \cong \triangle DEF$	SSS
5) $\angle C \cong \angle F$	CPCTC

Ex. 2.

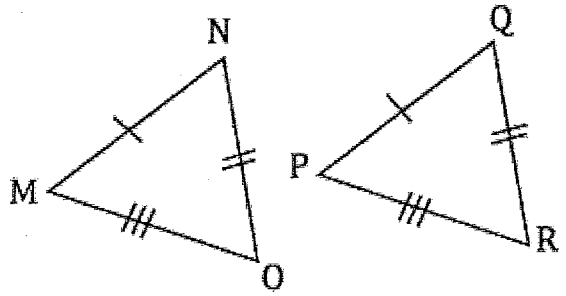
Given: $\overline{GH} \parallel \overline{IJ}$, $\angle IGJ \cong \angle HJG$



Prove: $\overline{IG} \cong \overline{HJ}$

Statement	Reason
1) $\overline{GH} \parallel \overline{IJ}$	Given
2) $\angle IGJ \cong \angle HJG$	Given
3) $\angle HGJ \cong \angle IJG$	Alt. Interior angles $\cong$
4) $\overline{GJ} \cong \overline{GJ}$	Reflexive property
5) $\triangle GJI \cong \triangle JGH$	ASA
6) $\overline{IG} \cong \overline{HJ}$	~~CCPT~~ CPCTC

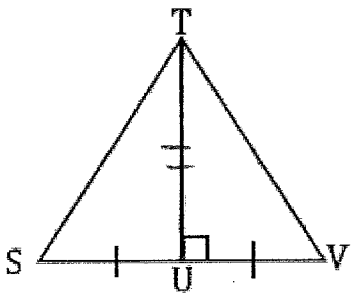
1. Given: $\overline{MN} \cong \overline{PQ}$, $\overline{NO} \cong \overline{QR}$, and $\overline{OM} \cong \overline{RP}$



Prove: $\angle M \cong \angle P$

Statement	Reason
1)	
2)	
3)	
4)	SSS
5) $\angle M \cong \angle P$	CPCTC

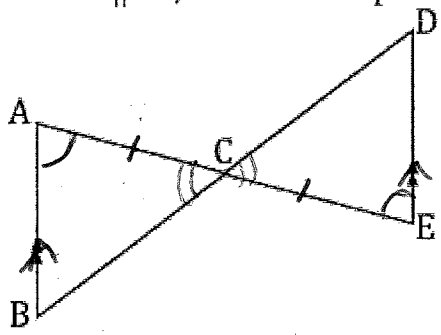
2. Given: $\overline{SU} \cong \overline{UV}$



Prove: $\overline{ST} \cong \overline{VT}$

Statement	Reason
1) $SU \cong UV$	
2) $\overline{TU} \cong \overline{TU}$	
3) $\Delta STU \cong \Delta VTU$	SAS
4) $\overline{ST} \cong \overline{VT}$	CPCTC

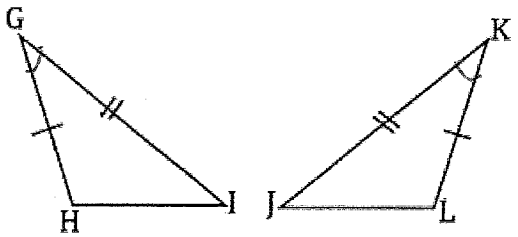
3. Given: $\overline{AB} \parallel \overline{DE}$, C is the midpoint of $\overline{AE}$



Prove: $\overline{BC} \cong \overline{DC}$

Statement	Reason
1) $\overline{AB} \parallel \overline{DE}$	
2) C is midpt. of $\overline{AE}$	Given
3) $\overline{AC} \cong \overline{CE}$	
4) $\angle BAC \cong \angle DEC$	Alt. interior angles $\cong$
5) $\angle ACB \cong \angle DCE$	vertical angles $\cong$
6) $\Delta BAC \cong \Delta DEC$	ASA
7) $DC = DC$	CPCTC

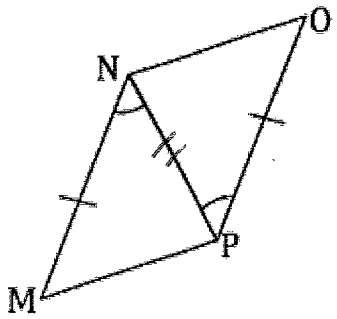
4. Given: $\overline{GH} \cong \overline{KL}$, $\angle G \cong \angle K$, and $\overline{GI} \cong \overline{KJ}$



Prove: $\overline{HI} \cong \overline{LJ}$

Statement	Reason
1) $\overline{GH} \cong \overline{KL}$	Given
2) $\angle G \cong \angle K$	Given
3) $\overline{GI} = \overline{KJ}$	Given
4) $\triangle HGI \cong \triangle LKJ$	SAS
5) $\overline{HI} \cong \overline{LJ}$	CPCTC

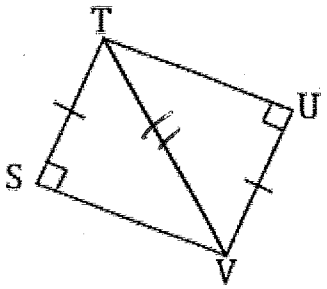
5. Given: $\angle MNP \cong \angle OPN$, and $\overline{MN} \cong \overline{OP}$



Prove: $\overline{MP} \cong \overline{NO}$

Statement	Reason
1) $\angle MNP \cong \angle OPN$	Given
2) $\overline{MN} \cong \overline{OP}$	Given
3) $\overline{NP} \cong \overline{NP}$	Reflexive
4) $\triangle MNP \cong \triangle OPN$	SAS
5) $\overline{MP} \cong \overline{NO}$	CPCTC

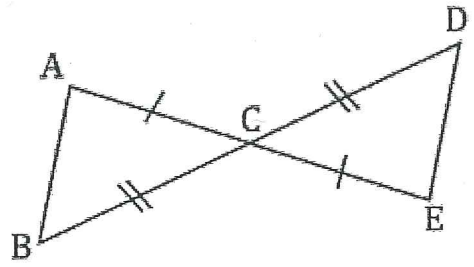
6. Given: $\overline{ST} \cong \overline{VU}$



Prove: $\angle SVT \cong \angle UTV$

Statement	Reason
1) $\overline{ST} \cong \overline{VU}$	Given
2) $\overline{TV} \cong \overline{TV}$	Reflexive property
3) $\triangle TSV \cong \triangle VUT$	HL
4) $\angle SVT \cong \angle UTV$	CPCTC

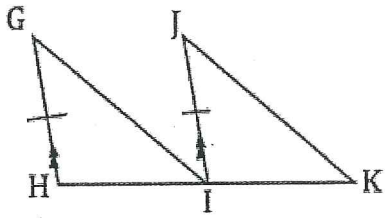
7. Given: $\overline{AC} \cong \overline{CE}$, $\overline{DC} \cong \overline{BC}$



Prove: $\angle B \cong \angle D$

Statement	Reason
1)	
2)	
3)	
4)	
5)	

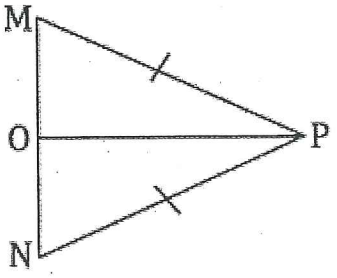
8. Given: $\overline{GH} \parallel \overline{JI}$, I is the midpoint of HK and $\overline{GH} \cong \overline{JI}$



Prove: $\angle G \cong \angle J$

Statement	Reason
1) $\overline{GH} \parallel \overline{IJ}$	Given
2) I is midpt of HK	Given
3) $\overline{GH} \cong \overline{JI}$	Given
4) $\overline{HI} \cong \overline{IK}$	Def. of midpt.
5) $\angle GHI \cong \angle JIK$	Corresponding angles $\cong$
6) $\Delta GHI \cong \Delta JIK$	SAS
7) $\angle G \cong \angle J$	CPCTC

9. Given: $\overline{MP} \cong \overline{NP}$, $\overline{MN} \perp \overline{OP}$



Prove: $\overline{MO} \cong \overline{ON}$

Statement	Reason
1)	
2)	
3)	
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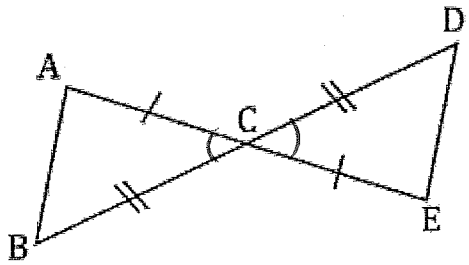
5)	

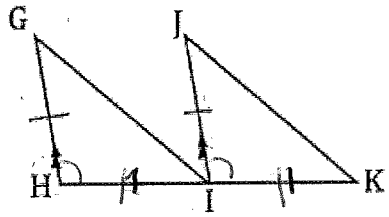
7. Given: $\overline{AC} \cong \overline{CE}$, $\overline{DC} \cong \overline{BC}$



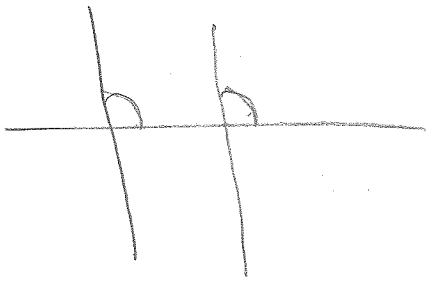
Prove: $\angle B \cong \angle D$

Statement	Reason
1) $\overline{AC} \cong \overline{CE}$	Given
2) $\overline{DC} \cong \overline{BC}$	Given
3) $\angle ACB \cong \angle DCE$	Vertical Angles
4) $\triangle ACB \cong \triangle ECD$	SAS
5) $\angle B \cong \angle D$	CPCTC

8. Given: $\overline{GH} \parallel \overline{JI}$, I is the midpoint of HK and $\overline{GH} \cong \overline{JI}$

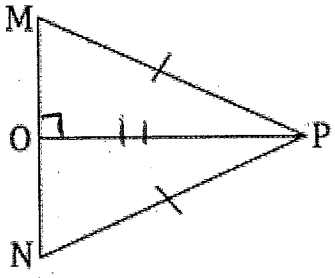


Prove: $\angle G \cong \angle J$



Statement	Reason
1)	
2)	
3) $\overline{HI} \cong \overline{IK}$	Definition of midpt.
4) $\angle GHI \cong \angle JIK$	corresponding angles $\cong$
5) $\triangle GHI \cong \triangle JIK$	SAS
6) $\angle G \cong \angle J$	CPCTC

9. Given: $\overline{MP} \cong \overline{NP}$, $\overline{MN} \perp \overline{OP}$



Prove: $\overline{MO} \cong \overline{ON}$

Statement	Reason
1) $\overline{MP} \cong \overline{NP}$	Given
2) $\overline{MN} \perp \overline{OP}$	Given
3) $\overline{PO} \cong \overline{PO}$	Reflexive
4) $\triangle PMO \cong \triangle PNO$	HL
5) $\overline{MO} \cong \overline{ON}$	CPCTC