

# Proofs Involving CPCTC

How to fix your car...

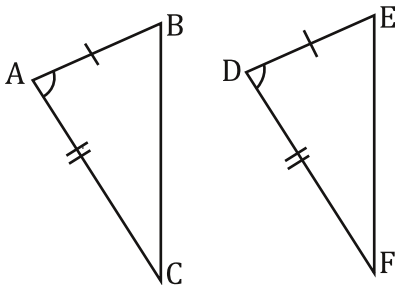
Okay, remember that to use CPCTC (Corresponding Parts of Congruent Triangles are Congruent), it's like saying that the carburetor from a '57 Chevy will be the same as the carburetor from another '57 Chevy. But, if you have two carburetors from two unknown cars, who knows if they are same or not? Okay, maybe a experienced mechanic could tell, but not me.

So remember... BEFORE YOU USE CPCTC YOU MUST PROVE THAT THE TRIANGLES IN QUESTION ARE CONGRUENT FIRST!!!

Let's analyze a couple of these, and then we will get to practicing...

Ex. 1.

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



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

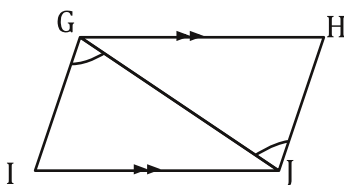
Statements	Reasons
1. $\overline{AB} \cong \overline{DE}$	1. Given
2. $\angle A \cong \angle D$	2. Given
3. $\overline{AC} \cong \overline{DF}$	3. Given
B2: 4. $\triangle ABC \cong \triangle DEF$	4. SAS
B1: 5. $\angle C \cong \angle F$	5. CPCTC

Analysis:

Working backwards, the statement "Prove:  $\angle C \cong \angle F$ " begs the key question, "How can we show two segments from two different triangles are congruent?" The answer? CPCTC. This means that if we can prove the triangles are congruent then  $\angle C \cong \angle F$  because they are corresponding parts of congruent triangles. So B1:  $\angle C \cong \angle F$  by CPCTC. This then begs the second key question, "How can I show two triangles are congruent?" This means B2 will be  $\triangle ABC \cong \triangle DEF$  by some congruence property. Which one? Now we work forward and see we have  $\overline{AB} \cong \overline{DE}$ ,  $\angle A \cong \angle D$ , and  $\overline{AC} \cong \overline{DF}$  which are all given, This means  $\triangle ABC \cong \triangle DEF$ , which is B2, and the proof is complete.

Ex. 2.

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



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

Statements	Reasons
1. $\overline{GH} \parallel \overline{IJ}$	1. Given
2. $\angle IGJ \cong \angle HJG$	2. Given
3. $\angle HGJ \cong \angle IJG$	3. Alternate Interior
4. $\overline{GJ} \cong \overline{GJ}$	4. Reflexive Property
B2: 5. $\triangle IGJ \cong \triangle HJG$	5. ASA
B1: 6. $\overline{IG} \cong \overline{HJ}$	6. CPCTC

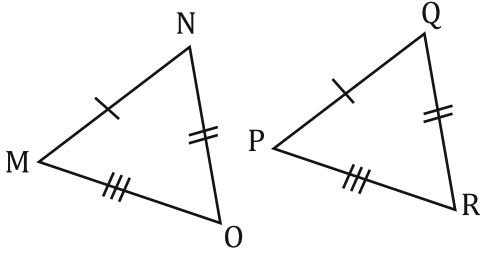
Analysis:

Working backwards, the statement "Prove:  $\overline{IG} \cong \overline{HJ}$ " begs the key question, "How can we show two segments from two different triangles are congruent?" The answer? CPCTC. This means that if we can prove the triangles are congruent then  $\overline{IG} \cong \overline{HJ}$  because they are corresponding parts of congruent triangles. So B1  $\overline{IG} \cong \overline{HJ}$  by CPCTC. This then begs the second key question, "How can I show two triangles are congruent?" This means B2 will be  $\triangle IGJ \cong \triangle HJG$  by some congruence property. Which one? Now we work forward and see we have  $\overline{GH} \parallel \overline{IJ}$ , and  $\angle IGJ \cong \angle HJG$ , Given. We know when we see parallel lines we look for alternate interior or corresponding angles. We have alternate interior angles  $\angle HGJ \cong \angle IJG$ . We also have  $\overline{GJ}$  as a shared side. This means  $\triangle IGJ \cong \triangle HJG$  by ASA, which is B2, and the proof is complete.

Write an analysis of each proof below.

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

Analysis:

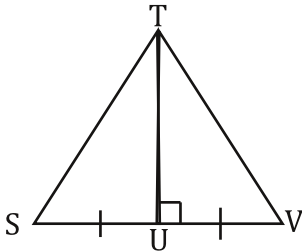


Prove:  $\angle M \cong \angle P$

Statements	Reasons
1. $\overline{MN} \cong \overline{PQ}$	1. Given
2. $\overline{NO} \cong \overline{QR}$	2. Given
3. $\overline{OM} \cong \overline{RP}$	3. Given
B2: 4. $\triangle MNO \cong \triangle PQR$	4. SSS
B1: 5. $\angle M \cong \angle P$	5. CPCTC

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

Analysis:

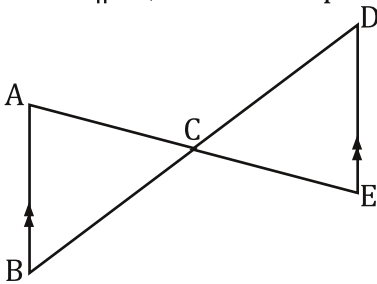


Prove:  $\overline{ST} \cong \overline{VT}$

Statements	Reasons
1. $\overline{SU} \cong \overline{UV}$	1. Given
2. $\overline{TU} \cong \overline{TU}$	2. Reflexive Properties
B2: 3. $\triangle STU \cong \triangle VUT$	3. HL
B1: 4. $\overline{ST} \cong \overline{VT}$	4. CPCTC

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

Analysis:

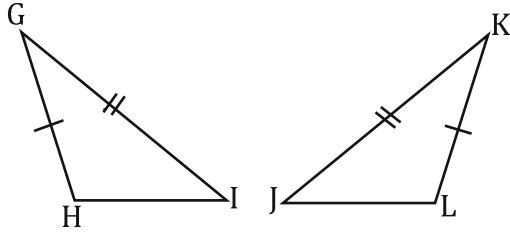


Prove:  $\overline{BC} \cong \overline{DC}$

Statements	Reasons
1. $\overline{AB} \cong \overline{DE}$	1. Given
2. C is the midpoint of $\overline{AE}$	2. Given
3. $\angle BAC \cong \angle DEC$	3. Alternate Interior
4. $\overline{AC} \cong \overline{EC}$	4. Def. of Midpoint
5. $\angle ACB \cong \angle DCE$	5. Vertical Angles
B2: 6. $\triangle ABC \cong \triangle DEC$	6. ASA
B1: 7. $\overline{BC} \cong \overline{DC}$	7. CPCTC

Fill in the missing information in each proof.

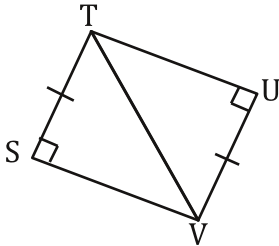
4. Given:  $\overline{GH} \cong \overline{KL}$ ,  $\angle G \cong \angle K$ , and  $\overline{GI} \cong \overline{KJ}$



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

Statements	Reasons
1. $\overline{GH} \cong \overline{KL}$	1. Given
2.	2. Given
3. $\overline{GI} \cong \overline{KJ}$	3.
4.	4. SAS
5. $\overline{HI} \cong \overline{LJ}$	5.

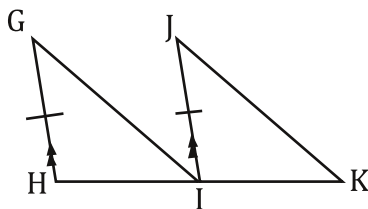
6. Given:  $\overline{ST} \cong \overline{UV}$



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

Statements	Reasons
1.	1. Given
2.	2. Reflexive Property
3.	3. HL
4. $\angle SVT \cong \angle UTV$	4.

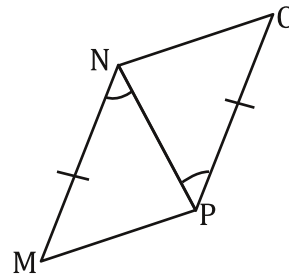
8. Given:  $\overline{GH} \parallel \overline{JI}$ , I is the midpoint of  $\overline{HK}$  and  $\overline{GH} \cong \overline{JI}$



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

Statements	Reasons
1. $\overline{GH} \parallel \overline{JI}$	1.
2. I is the midpoint of $\overline{HK}$	2.
3.	3. Given
4. $\overline{HI} \cong \overline{IK}$	4.
5.	5. Corresponding
6.	6. SAS
7. $\angle G \cong \angle J$	7.

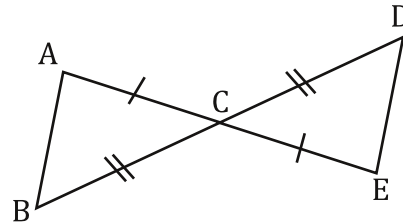
5. Given:  $\angle MNP \cong \angle OPN$ , and  $\overline{MN} \cong \overline{OP}$



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

Statements	Reasons
1.	1. Given
2. $\overline{MN} \cong \overline{OP}$	2.
3. $\overline{NP} \cong \overline{NP}$	3.
4. $\triangle MNP \cong \triangle OPN$	4.
5.	5. CPCTC

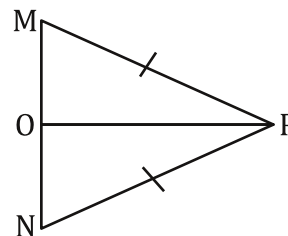
7. Given:  $\overline{AC} \cong \overline{CE}$ ,  $\overline{DC} \cong \overline{BC}$



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

Statements	Reasons
1.	1.
2.	2. Given
3. $\angle ACB \cong \angle DCE$	3.
4. $\triangle ABC \cong \triangle CDE$	4.
5. $\angle B \cong \angle D$	5.

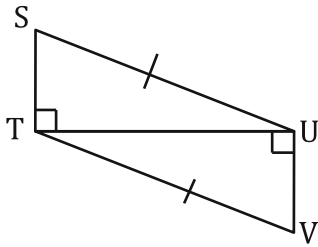
9. Given:  $\overline{MP} \cong \overline{NP}$ ,  $\overline{MN} \perp \overline{OP}$



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

Statements	Reasons
1.	1. Given
2. $\overline{MN} \perp \overline{OP}$	2.
3. $\overline{OP} \cong \overline{OP}$	3.
4. $\triangle MOP \cong \triangle NOP$	4.
5.	5.

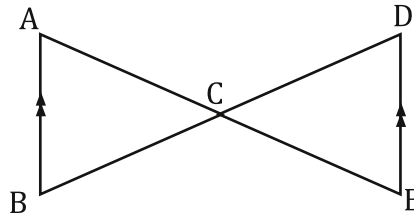
10. Given:  $\overline{SU} \cong \overline{VT}$



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

Statements	Reasons
1. $\overline{SU} \cong \overline{VT}$	1.
2.	2.
3.	3. HL
4.	4. CPCTC

11. Given:  $\overline{AB} \parallel \overline{DE}$ ,  $\overline{AE}$  bisects  $\overline{BD}$

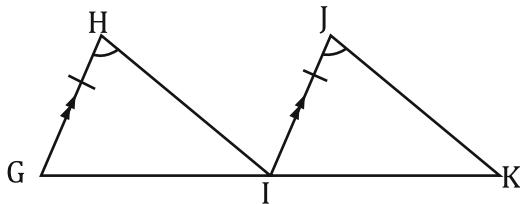


Prove:  $\overline{AC} \cong \overline{EC}$

Statements	Reasons
1.	1.
2.	2. Given
3. $\angle ABC \cong \angle EDC$	3.
4. $\angle ACB \cong \angle DCE$	4.
5.	5. Def of Bisect
6. $\triangle ABC \cong \triangle EDC$	6.
7.	7.

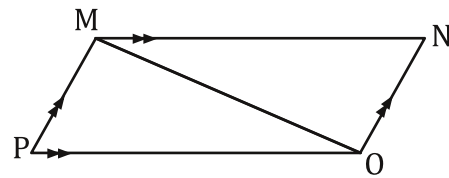
13. Given:  $\overline{PM} \parallel \overline{NO}$ ,  $\overline{MN} \parallel \overline{PO}$ ,

12. Given:  $\overline{GH} \parallel \overline{IJ}$ ,  $\angle H \cong \angle J$  and  $\overline{GH} \cong \overline{IJ}$



Prove:  $\angle GIH \cong \angle IKJ$

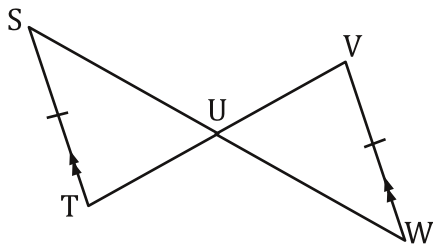
Statements	Reasons
1.	1. Given
2. $\angle H \cong \angle J$	2.
3.	3.
4.	4. Alternate Interior
5.	5.
6.	6. CPCTC



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

Statements	Reasons
1. $\overline{PM} \parallel \overline{ON}$	1.
2.	2. Given
3. $\angle PMO \cong \angle NOP$	3.
4.	4. Alternate Interior
5. $\overline{MO} \cong \overline{MO}$	5.
6.	6. ASA
7.	7.

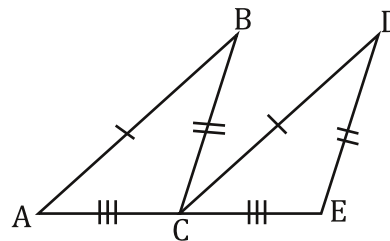
14. Given:  $\overline{ST} \parallel \overline{VW}$ , and  $\overline{ST} \cong \overline{VW}$



Prove:  $\overline{SU} \cong \overline{WU}$

Statements	Reasons
1.	1. Given
2.	2. Given
3.	3. Alternate Interior
4. $\angle SUT \cong \angle WUV$	4.
5.	5. AAS
6.	6.

15. Given:  $\overline{AB} \cong \overline{CD}$ ,  $\overline{BC} \cong \overline{DE}$ , and  $\overline{AC} \cong \overline{CE}$

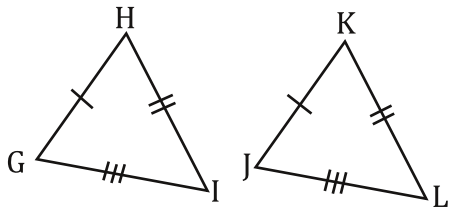


Prove:  $\angle A \cong \angle DCE$

Statements	Reasons
1. $\overline{AB} \cong \overline{CD}$	1.
2. $\overline{BC} \cong \overline{DE}$	2.
3.	3. Given
4.	4.
5.	5.

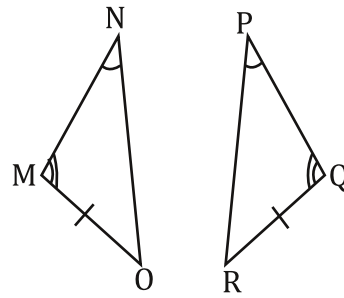
Write a two column proof for each.

16. Given:  $\overline{GH} \cong \overline{JK}$ ,  $\overline{HI} \cong \overline{KL}$ , and  $\overline{IG} \cong \overline{LJ}$



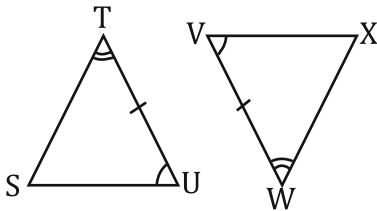
Prove:  $\angle I \cong \angle L$

17. Given:  $\angle N \cong \angle P$ ,  $\angle M \cong \angle Q$ , and  $\overline{MO} \cong \overline{QR}$



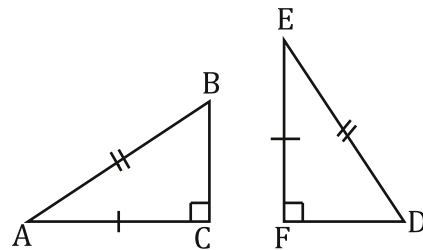
Prove:  $\angle O \cong \angle R$

18. Given:  $\angle U \cong \angle V$ ,  $\angle T \cong \angle W$ , and  $\overline{TU} \cong \overline{VW}$



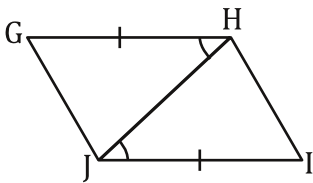
Prove:  $\angle S \cong \angle X$

19. Given:  $\overline{AC} \cong \overline{EF}$ , and  $\overline{AB} \cong \overline{ED}$



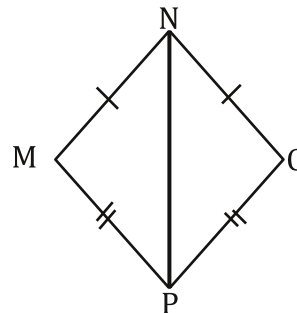
Prove:  $\overline{BC} \cong \overline{FD}$

20. Given:  $\overline{GH} \cong \overline{JI}$ ,  $\angle GHJ \cong \angle IJH$



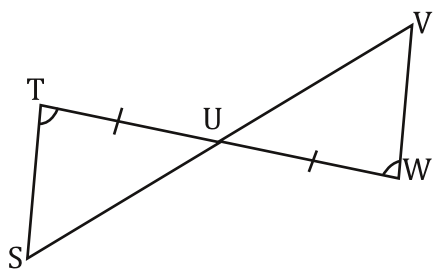
Prove:  $\overline{GJ} \cong \overline{HI}$

21. Given:  $\overline{MN} \cong \overline{NO}$ ,  $\overline{MP} \cong \overline{OP}$



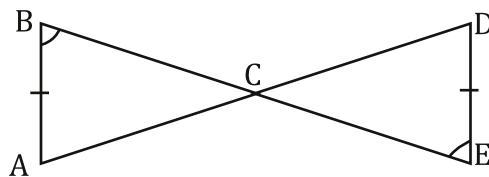
Prove:  $\angle O \cong \angle M$

22. Given:  $\overline{TU} \cong \overline{WU}$ ,  $\angle T \cong \angle W$



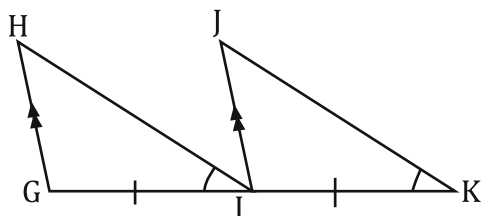
Prove:  $\overline{TS} \cong \overline{WV}$

23. Given:  $\overline{AB} \cong \overline{DE}$ ,  $\angle B \cong \angle E$



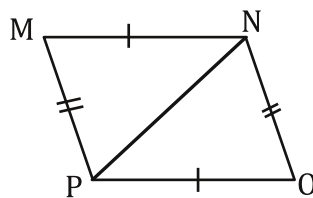
Prove:  $\overline{AC} \cong \overline{DC}$

24. Given:  $\overline{HG} \parallel \overline{JI}$ ,  $\overline{GI} \cong \overline{IK}$ , and  $\angle HIG \cong \angle JKI$



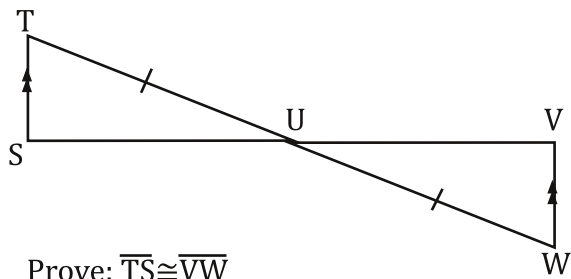
Prove:  $\angle C \cong \angle F$

25. Given:  $\overline{MN} \cong \overline{PO}$ ,  $\overline{MP} \cong \overline{NO}$



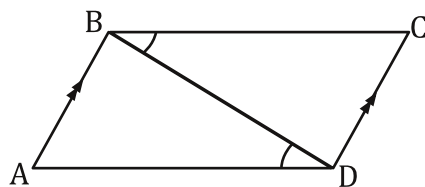
Prove:  $\angle M \cong \angle O$

26. Given:  $\overline{TS} \parallel \overline{VW}$ ,  $\overline{TU} \cong \overline{WU}$



Prove:  $\overline{TS} \cong \overline{VW}$

27. Given:  $\overline{AB} \parallel \overline{DE}$ ,  $\angle CBD \cong \angle ADB$



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