

# Geometry, *You Can Do It!*

## Proofs: cpctc

by Bill Hanlon

When two triangles are congruent, each part of one triangle is congruent to the corresponding part of the other triangle.

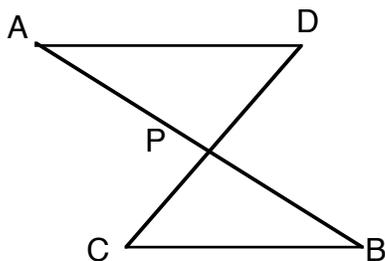
You can determine if two line segments or two angles are congruent by showing they are the corresponding parts of two congruent triangles.

One way to prove two segments or two angles are congruent is by:

1. Identify two triangles in which two segments or angles are the corresponding parts.
2. Prove the triangles are congruent.
3. State the two parts are congruent, supporting the statement with the reason; "corresponding parts of congruent triangles are congruent"

That reason is normally abbreviated "**cpctc**"

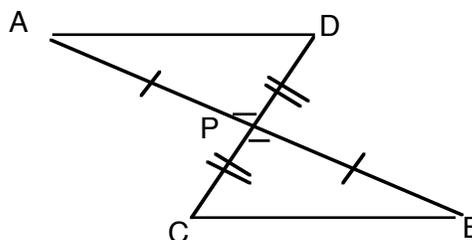
Let's see if we can prove two line segments are congruent.



Given:  $\overline{AB}$  and  $\overline{CD}$  bisect each other  
 Prove:  $\overline{AD} \cong \overline{BC}$

Now the strategy to prove the segments are congruent is to first show the triangles are congruent.

So, let's fill in the picture showing the congruences that exist using our previously learned definitions, theorems, and postulates.



Using the definition of bisector, I can determine that  $\overline{AP} \cong \overline{PB}$  and  $\overline{CP} \cong \overline{PD}$ . I also notice I have a pair of vertical angles.

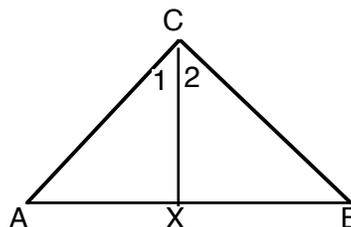
Let's go ahead and fill in the body of the proof

Statements	Reasons
1. $\overline{AB}$ and $\overline{CD}$ bisect each other	Given
2. $\overline{AP} \cong \overline{PB}$ $\overline{CP} \cong \overline{PD}$	Def. of bisector
3. $\angle APD \cong \angle PBC$	Vert $\angle$ 's $\cong$
4. $\triangle APD \cong \triangle PBC$	SAS
5. $\overline{AD} \cong \overline{BC}$	cpctc

Filling in the body of the proof is easy after you mark the congruences in your picture.

The strategy to show angles or segments are congruent is to first show the triangles are congruent, then use cpctc.

Try this one on your own.



Given:  $\overline{AC} \cong \overline{BC}$ ,  $\overline{AX} \cong \overline{BX}$

Prove:  $\angle 1 \cong \angle 2$

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