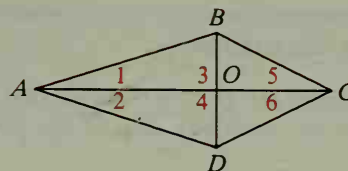


**Example**

 Given:  $\angle 1 \cong \angle 2$ ;  $\angle 5 \cong \angle 6$ 

 Prove:  $\overline{AC} \perp \overline{BD}$ 


**Plan for Proof:** It may be helpful here to *reason backward* from what you want to prove. You can show  $\overline{AC} \perp \overline{BD}$  if you can show that  $\angle 3 \cong \angle 4$ . You can prove  $\angle 3 \cong \angle 4$  if you can prove that the angles are corresponding parts of congruent triangles. To prove  $\triangle ABO \cong \triangle ADO$ , you need  $\overline{AB} \cong \overline{AD}$ . You can prove this congruence by proving that  $\triangle ABC \cong \triangle ADC$ . You should prove this congruence first.

**Proof:**

Statements	Reasons
1. $\angle 1 \cong \angle 2$ ; $\angle 5 \cong \angle 6$	1. Given
2. $\overline{AC} \cong \overline{AC}$	2. Reflexive Property
3. $\triangle ABC \cong \triangle ADC$	3. ASA Postulate
4. $\overline{AB} \cong \overline{AD}$	4. Corr. parts of $\cong \triangle$ are $\cong$ .
5. $\overline{AO} \cong \overline{AO}$	5. Reflexive Property
6. $\triangle ABO \cong \triangle ADO$	6. SAS Postulate (Steps 1, 4, and 5)
7. $\angle 3 \cong \angle 4$	7. Corr. parts of $\cong \triangle$ are $\cong$ .
8. $\overline{AC} \perp \overline{BD}$	8. If two lines form $\cong$ adj. $\angle$ s, then the lines are $\perp$ .

If you were to outline this two-column proof, you might pick out the following *key steps*.

**Key steps of proof:**

1.  $\triangle ABC \cong \triangle ADC$  (ASA Postulate)
2.  $\overline{AB} \cong \overline{AD}$  (Corr. parts of  $\cong \triangle$  are  $\cong$ .)
3.  $\triangle ABO \cong \triangle ADO$  (SAS Postulate)
4.  $\angle 3 \cong \angle 4$  (Corr. parts of  $\cong \triangle$  are  $\cong$ .)
5.  $\overline{AC} \perp \overline{BD}$  (If two lines form  $\cong$  adj.  $\angle$ s, then the lines are  $\perp$ .)

In mathematics a proof is often given in paragraph form rather than in two-column form. A *paragraph proof* usually focuses on the key ideas and omits details that the writer thinks will be clear to the reader. The following paragraph proof might be given for the example above.

**Paragraph proof:**

$\triangle ABC \cong \triangle ADC$  by the ASA Postulate. Therefore, corresponding parts  $\overline{AB}$  and  $\overline{AD}$  are congruent.  $\overline{AB}$  and  $\overline{AD}$  are also corresponding parts of  $\triangle ABO$  and  $\triangle ADO$ , which can now be proved congruent by the SAS Postulate. So corresponding parts  $\angle 3$  and  $\angle 4$  are congruent, and  $\overline{AC} \perp \overline{BD}$ .