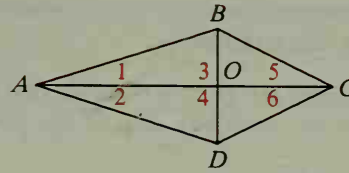**Example**

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. $\angle$, 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. $\angle$, 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 $\overline{AC} \perp \overline{BD}$.