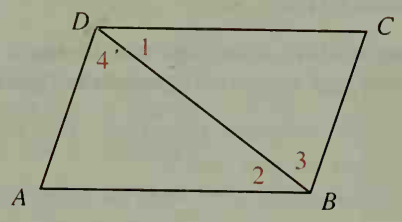
Write proofs in two-column form.

6. Given: $\angle 1 \cong \angle 2$; $\angle 3 \cong \angle 4$
Prove: $\triangle ADB \cong \triangle CBD$

7. Given: $\overline{CD} \cong \overline{AB}$; $\overline{CB} \cong \overline{AD}$
Prove: $\angle 1 \cong \angle 2$

8. Given: $\overline{AD} \parallel \overline{BC}$; $\overline{AD} \cong \overline{CB}$
Prove: $\overline{DC} \parallel \overline{AB}$



Application

Bracing With Triangles

The two famous landmarks pictured above have much in common. They were completed within a few years of each other, the Eiffel Tower in 1889 and the Statue of Liberty in 1886. The French engineer Gustave Eiffel designed both the tower's sweeping form and the complex structure that supports Liberty's copper skin. And both designs gain strength from the rigidity of the triangular shape.

The strength of triangular bracing is related to the SSS Postulate, which tells us that a triangle with given sides can have only one shape. A rectangle formed by four bars joined at their ends can flatten into a parallelogram, but the structural triangle cannot be deformed except by bending or stretching the bars.

The Eiffel Tower's frame is tied together by a web of triangles. A portion of the statue's armature is shown in the photograph at the right. The inner tower of wide members is strengthened by double diagonal bracing. A framework of lighter members, also joined in triangular patterns, surrounds this core.

Structural engineers use geometry in designing bridges, towers, and large-span roofs. See what you can find out about Eiffel's bridges and about the work of some of the other great modern builders.