$\qquad$

## Challenge: Skills and Applications

For use with pages 236-242

1. In the diagram, $\overline{A C} \cong \overline{B C}, \overline{B D} \cong \overline{C D}$, and
$\overline{C A}$ bisects $\angle B C D$.
a. Find $m \angle B$.
b. Write a paragraph proof for your result.
c. Prove that $A C=A D$.

2. Write a two-column proof.

Given: $\overline{E F} \cong \overline{F H} \cong \overline{H G}, \overline{F G} \cong \overline{G I}$
Prove: $\overline{E G} \cong \overline{H I}$

3. A segment which extends from a vertex of a triangle to the side opposite the vertex is called an altitude if it is perpendicular to that side. In this exercise, you will prove that if two altitudes of a triangle are congruent, then the triangle is isosceles. Write a paragraph proof.

Given: $\overline{K M} \perp \overline{J L}, \overline{J N} \perp \overline{L K}, \overline{K M} \cong \overline{J N}$
Prove: $\overline{J L} \cong \overline{K L}$

4. Write a two-column proof of the Base Angles Theorem without drawing any additional segments or points.
Given: $\triangle A B C, \overline{A B} \cong \overline{A C}$
Prove: $\angle B \cong \angle C$

5. In this exercise, you will prove the HL Congruence Theorem.

Write a paragraph proof (without using the HL Congruence Theorem).
Given: $\triangle P Q R$ and $\triangle S T U, \overline{Q R} \cong \overline{T U}, \overline{P R} \cong \overline{S U}$,
$\angle P Q R$ and $\angle S T U$ are right angles.
Prove: $\triangle P Q R \cong \triangle S T U$
(Hint: Extend $\overline{S T}$ to $V$ so that $P Q=T V$. Draw $\overline{U V}$. Prove that $\triangle P Q R \cong \triangle V T U$ and $\triangle V T U \cong \triangle S T U$.)


