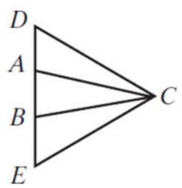
Sections 3.5 & 3.6 Proofs

6. *Given:* C not on $\overline{DABE}$ and $\overline{CA} \cong \overline{CB}$

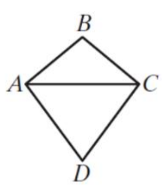
Prove: $\angle CAD \cong \angle CBE$



Statement	Reason
1. $\overline{CA} \cong \overline{CB}$	1. Given
2. $\angle BAC \cong \angle ABC$	2. Isosceles Triangle Theorem
3. $\angle CAD$ and $\angle CAB$ are supplementary $\angle EBC$ and $\angle ABC$ are supplementary	3. If two angles form a linear pair, then they are supplementary
4. $\angle CAD \cong \angle CBE$	4. The supplements of congruent angles are congruent

7. *Given:* Quadrilateral $ABCD$ with $\overline{AB} \cong \overline{CB}$ and $\overline{AD} \cong \overline{CD}$

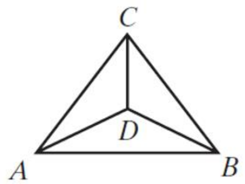
Prove: $\angle BAD \cong \angle BCD$



Statement	Reason
1. $\overline{AB} \cong \overline{CB}$	1. Given
2. $\overline{AD} \cong \overline{CD}$	2. Given
3. $\overline{BD} \cong \overline{BD}$	3. Reflexive property of ≅
4. $\Delta BAD \cong \Delta BCD$	4. SSS ≅ (steps 1,2,3)
5. $\angle BAD \cong \angle BCD$	5. corresponding parts of ≅ triangles are ≅

9. *Given:* $\overline{AC} \cong \overline{BC}$ and $\angle DAB \cong \angle DBA$

Prove: $\angle CAD \cong \angle CBD$



Statement	Reason
1. $\overline{AC} \cong \overline{BC}$	1. Given
2. $\angle DAB \cong \angle DBA$	2. Given
3. $\overline{AD} \cong \overline{BD}$	3. Converse of Isosceles Triangle Theorem
4. $\overline{CD} \cong \overline{CD}$	4. Reflexive property of $\cong$
5. $\Delta ACD \cong \Delta BCD$	5. SSS $\cong$ (steps 1,3,4)
6. $\angle CAD \cong \angle CBD$	6. Corresponding parts of $\cong$ triangles are $\cong$

17. Prove the **Converse of the Isosceles Triangle Theorem**: If two angles of a triangle are congruent, then the sides opposite those angles are congruent. (Hint: Assume ΔABC where $\angle A \cong \angle B$. Then draw the angle bisector of $\angle C$ to point D on $\overline{AB}$. Try to prove that $\Delta ACD \cong \Delta BCD$.)

Given: ΔABC has $\angle A \cong \angle B$, $\overline{CD}$ bisects $\angle ACB$

Statement	Reason
1. $\angle A \cong \angle B$	1. Given
2. $\overline{CB}$ bisects $\angle ACB$	2. Given
3. $\angle ACD \cong \angle BCD$	3. Definition of angle bisector
4. $\overline{CD} \cong \overline{CD}$	4. Reflexive Property
5. $\Delta ACD \cong \Delta BCD$	5. AAS $\cong$ (steps 1,3,4)
6. $\overline{AC} \cong \overline{BC}$	6. Corresponding parts of $\cong$ triangles are $\cong$

19. Prove that if a triangle is equiangular, then the triangle is equilateral.

Given: ΔABC is equiangular

Prove: ΔABC is equilateral

Statement	Reason
1. ΔABC is equiangular	1. Given
2. $\angle B \cong \angle C$	2. Definition of equiangular triangle
3. $\overline{AB} \cong \overline{AC}$	3. Converse of Isosceles triangle theorem
4. $\angle A \cong \angle C$	4. Definition of equiangular triangle
5. $\overline{AB} \cong \overline{CB}$	5. Converse of Isosceles triangle theorem
6. $\overline{AC} \cong \overline{CB}$	6. Transitive property of $\cong$
7. ΔABC is equilateral	7. Definition of equilateral triangle (3,5,6)