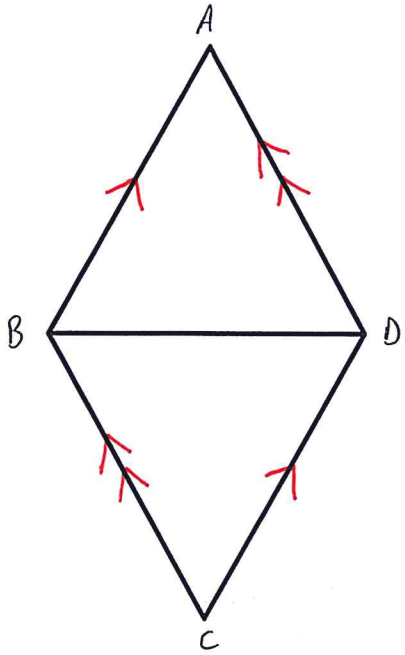
Geometric Proofs

Emphasis on Congruence by Angle – Side – Angle

Prove each of the following using Angle – Side – Angle:

1. **Given:** $\overline{AB} \parallel \overline{CD}$
   $\overline{DA} \parallel \overline{BC}$

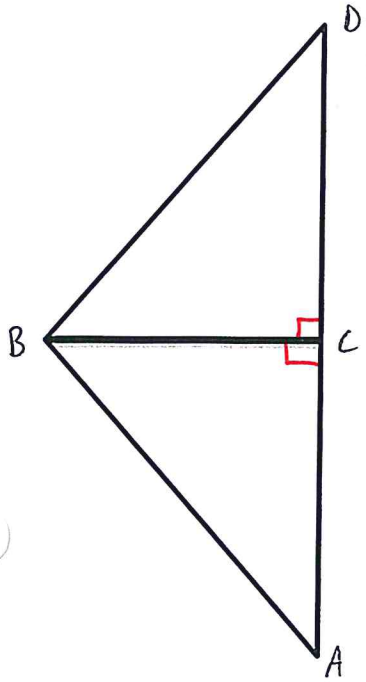
   Prove: Δ ABD ≅ Δ CDB



Statements	Reasons
(1) $\overline{AB} \parallel \overline{CD}$; $\overline{DA} \parallel \overline{BC}$	(1) Given
(2) $\overline{BD} \cong \overline{BD}$	(2) Reflexive Property
(3) $\angle ABD \cong \angle CDB$ $\angle ADB \cong \angle CBD$	(3) Alt. Int. Angles.
(4) Δ ABD ≅ Δ CDB	(4) ASA.

2. **Given:** $\overline{BC} \perp \overline{AD}$
   Δ ABD is an Isosceles Triangle
   C is the midpoint of $\overline{AD}$

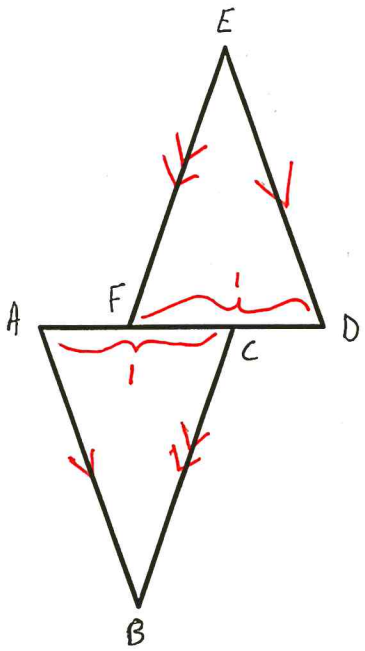
   Prove: Δ ABC ≅ Δ DBC



Statements	Reasons.
(1) $\overline{BC} \perp \overline{AD}$; ΔABD isosceles; C midpt. of $\overline{AD}$	(1) Given.
(2) $\angle BCD$ & $\angle BCA$ are Rt. $\angle$'s	(2) Def $\perp$
(3) $\angle BCD \cong \angle BCA$	(3) Rt. $\angle$'s ≅ Thm.
(4) $\overline{CD} \cong \overline{CA}$	(4) Definition Midpoint.
(5) $\angle A \cong \angle D$	(5) Definition Isosceles
(6) Δ ABC ≅ Δ DBC	(6) ASA.

3. **Given:** $\overline{AB} \parallel \overline{ED}$
$\overline{EF} \parallel \overline{CB}$
$\overline{AC} \cong \overline{DF}$

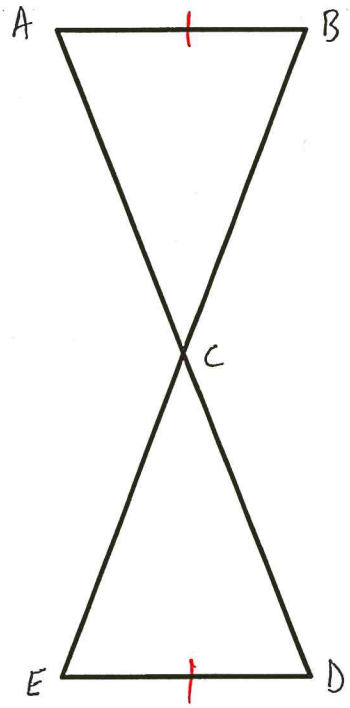
Prove: $\Delta ABC \cong \Delta DEF$



Statements	Reasons
① $\overline{AB} \parallel \overline{ED}$; $\overline{EF} \parallel \overline{CB}$; $\overline{AC} \cong \overline{DF}$	① Given
② $\angle EFD \cong \angle BCA$, $\angle A \cong \angle D$	② Alternate Interior Angl.
③ $\Delta ABC \cong \Delta DEF$	③ ASA.

4. **Given:** $\overline{AB} \parallel \overline{ED}$
$\overline{AB} \cong \overline{DE}$

Prove: $\Delta ABC \cong \Delta DEC$



Statements	Reasons
① $\overline{AB} \parallel \overline{ED}$, $\overline{AB} \cong \overline{DE}$	① Given.
② $\angle A \cong \angle D$; $\angle B \cong \angle E$	② Alternate Interior Angles.
③ $\Delta ABC \cong \Delta DEC$	③ ASA.