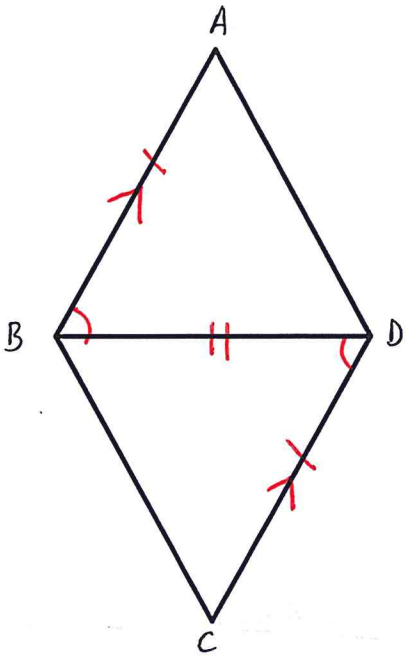
Geometric Proofs

Emphasis on Congruence by Side – Angle – Side

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

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

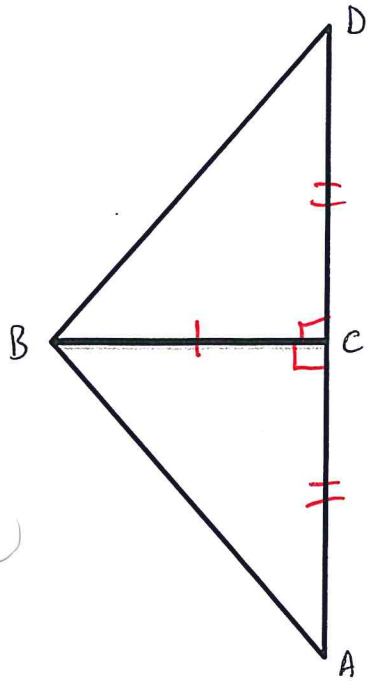
   Prove: Δ ABD ≅ Δ CDB



Statement	Reasons.
① $\overline{AB} \parallel \overline{CD}$; $\overline{AB} \cong \overline{CD}$	① Given.
② $\overline{BD} \cong \overline{BD}$	② Reflexive Property.
③ $\angle ABD \cong \angle CDB$	③ Alt. Int. ∠'s.
④ Δ ABD ≅ Δ CDB	④ SAS.

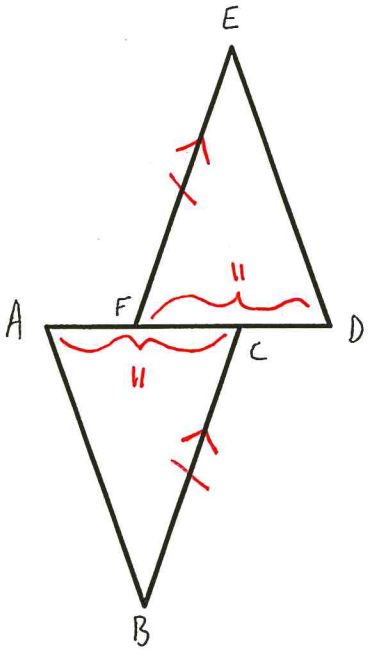
2. **Given:** $\overline{BC} \perp \overline{AD}$
   C is the midpoint of $\overline{AD}$

   Prove: Δ ABC ≅ Δ DBC



Statements	Reasons.
① $\overline{BC} \perp \overline{AD}$, C midpt of $\overline{AD}$	① Given
② $\overline{BC} \cong \overline{BC}$	② Reflexive Property
③ $\overline{AC} \cong \overline{DC}$	③ Definition Midpt.
④ $\angle BCD$ & $\angle BCA$ are Right ∠'s.	④ Definition Perpendicular (⊥)
⑤ $\angle BCD \cong \angle BCA$	⑤ Right Angles Congruence Theorem.
⑥ Δ ABC ≅ Δ DBC	⑥ SAS

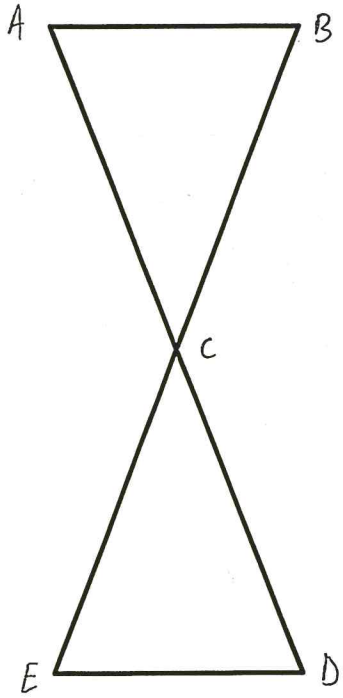
3. **Given:** $\overline{EF} \parallel \overline{BC}$
$\overline{EF} \cong \overline{BC}$
$\overline{AC} \cong \overline{DF}$
Prove: ABC $\cong$ Δ DEF



Statements	Reasons
① $\overline{EF} \parallel \overline{BC}$; $\overline{EF} \cong \overline{BC}$; $\overline{AC} \cong \overline{DF}$	① Given
② $\angle EFD \cong \angle BCA$	② Alternate Interior Angles.
③ $\Delta ABC \cong \Delta DEF$	③ SAS.

4. **Given:** C is the midpoint of $\overline{AD}$ & $\overline{BE}$

Prove: Δ ABC $\cong$ Δ DEC



Statements	Reasons.
① C midpt $\overline{AD}$ & $\overline{BE}$	① Given.
② $\overline{AC} \cong \overline{DC}$; $\overline{BC} \cong \overline{EC}$	② Definition Midpoint.
③ $\angle ACB \cong \angle DCE$	③ Vertical Angles.
④ $\Delta ABC \cong \Delta DEC$	④ SAS.