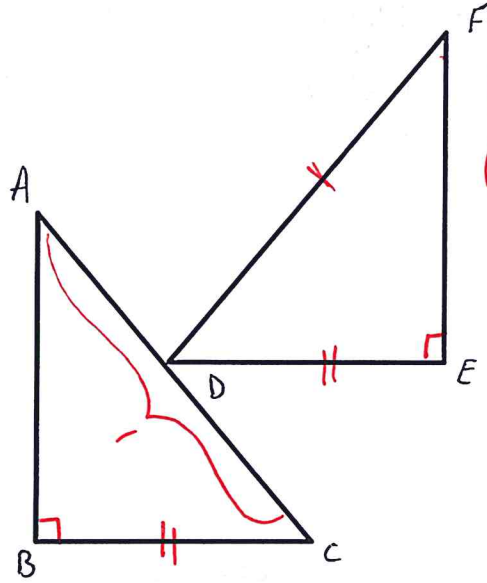
Geometric Proofs

Emphasis on Congruence by Hypotenuse - Leg

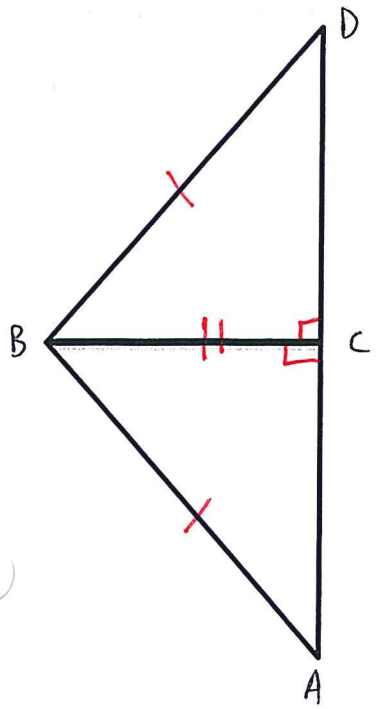
Prove each of the following using Hypotenuse - Leg:

1. **Given:** $\overline{AB} \perp \overline{BC}$
   $\overline{FE} \perp \overline{DE}$
   $\overline{AC} \cong \overline{FD}$
   $\overline{BC} \cong \overline{ED}$
   Prove: Δ ABC ≅ Δ FED



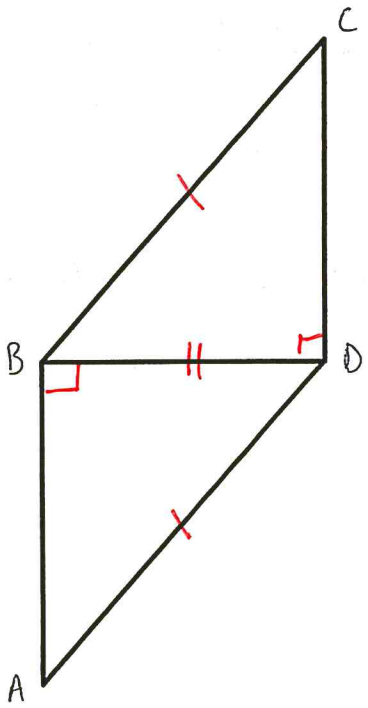
Statements	Reasons.
① $\overline{AB} \perp \overline{BC}$; $\overline{FE} \perp \overline{DE}$; $\overline{AC} \cong \overline{FD}$; $\overline{BC} \cong \overline{ED}$	① Given.
② ∠B & ∠E are Rt ∠'s.	② Def ⊥
③ Δ ABC & Δ FED are Rt. Δ's.	③ Def. Right Δ.
④ Δ ABC ≅ Δ FED	④ HL.

2. **Given:** $\overline{BC} \perp \overline{AD}$
   Δ ABD is an Isosceles Triangle
   Prove: Δ ABC ≅ Δ DBC



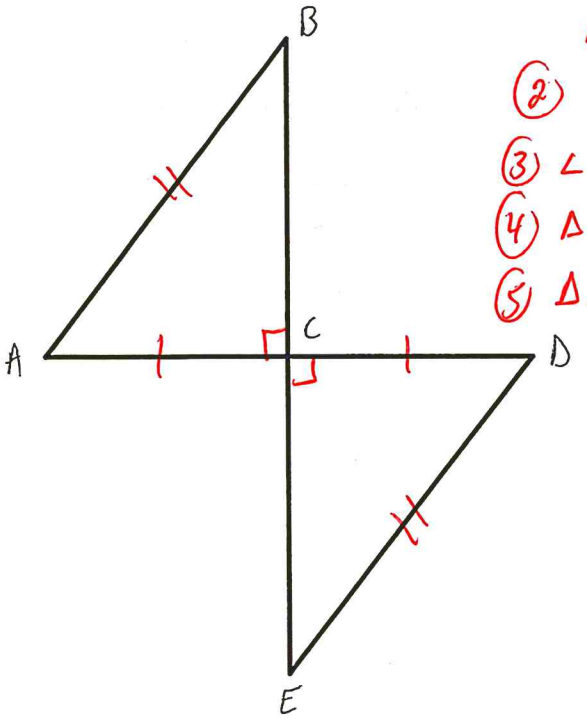
Statements	Reasons.
① $\overline{BC} \perp \overline{AD}$; Δ ABD is Isosceles.	① Given.
② $\overline{BC} \cong \overline{BC}$	② Reflexive.
③ $\overline{AB} \cong \overline{BD}$	③ Def. Isosceles Δ.
④ ∠BCD & ∠BCA are Rt. ∠'s.	④ Def ⊥
⑤ Δ ABC & Δ DBC are Rt. Δ's	⑤ Def Right Δ.
⑥ Δ ABC ≅ Δ DBC	⑥ HL.

3. **Given:** $\overline{BD} \perp \overline{CD}$
$\overline{BD} \perp \overline{AB}$
$\overline{AD} \cong \overline{CB}$
Prove: Δ BCD ≅ Δ DBA



Statements	Reasons.
① $\overline{BD} \perp \overline{CD}$; $\overline{BD} \perp \overline{AB}$, $\overline{AD} \cong \overline{CB}$	① Given.
② $\overline{BD} \cong \overline{BD}$	② Reflexive Property.
③ ∠CDB & ∠ABD are Rt∠'s	③ Definition ⊥
④ Δ BCD & Δ DBA are Rt Δ's	④ Def Right Δ.
⑤ Δ BCD ≅ Δ DBA	⑤ HL.

4. **Given:** $\overline{BE} \perp \overline{AD}$
C is the midpoint of $\overline{AD}$
$\overline{AB} \cong \overline{DE}$
Prove: Δ ABC ≅ Δ DEC



Statements	Reasons
① $\overline{BE} \perp \overline{AD}$; C midpt $\overline{AD}$; $\overline{AB} \cong \overline{DE}$	① Given.
② $\overline{AC} \cong \overline{DC}$	② Def. midpoint
③ ∠BCA & ∠ECD are Rt∠'s	③ Definition ⊥
④ Δ ABC & Δ DEC are Rt Δ's	④ Def. Right Δ
⑤ Δ ABC ≅ Δ DEC	⑤ HL.