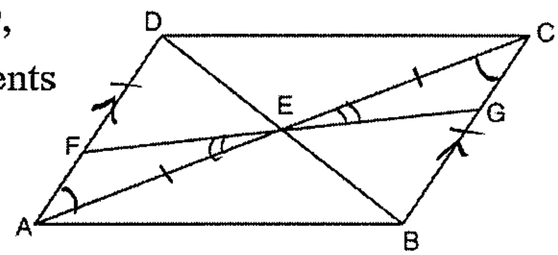
Quadrilateral Proofs

(Answer Key)

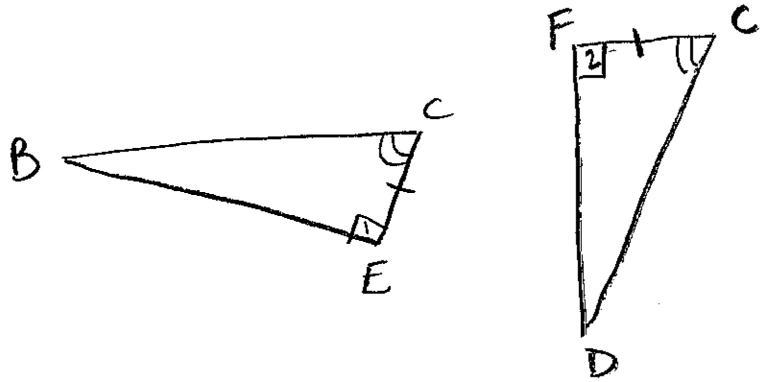
In the diagram below of quadrilateral $ABCD$, $\overline{AD} \cong \overline{BC}$ and $\angle DAE \cong \angle BCE$. Line segments AC, DB, and FG intersect at E.



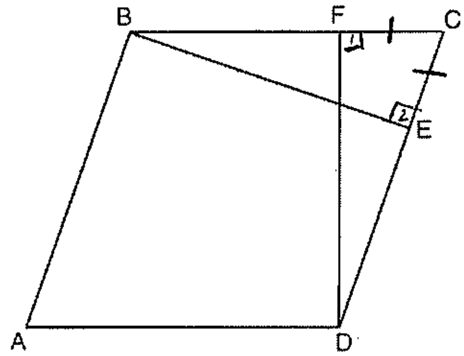
Prove: $\triangle AEF \cong \triangle CEG$

S	R
1) $\overline{AD} \cong \overline{BC}$, $\angle DAE \cong \angle BCE$	1) Given
2) $\overline{AD} \parallel \overline{BC}$	2) When alt. int. $\angle$'s $\cong$, lines are $\parallel$
3) ABCD is a parallelogram	3) A quad. w/ one pair of opp. sides both $\cong$ and $\parallel$ is a parallelogram
4) $\overline{EA} \cong \overline{CE}$	4) Diagonals of a parallelogram bisect each other
5) $\angle AEF \cong \angle CEG$	5) Vertical $\angle$'s are $\cong$

Quadrilateral Proofs



In the diagram of parallelogram $ABCD$ below, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, $\overline{CE} \cong \overline{CF}$.



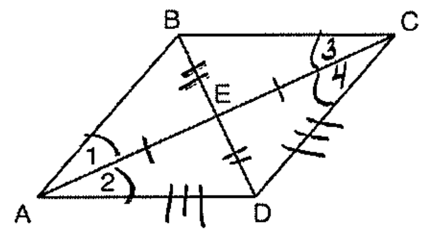
Prove $ABCD$ is a rhombus.

S	R
1) $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, $\overline{CE} \cong \overline{CF}$ Parallelogram ABCD	1) Given
2) $\angle 1$ and $\angle 2$ are right $\angle$'s	2) $\perp$ lines form right $\angle$'s
3) $\angle 1 \cong \angle 2$	3) Right $\angle$'s are $\cong$
4) $\angle C \cong \angle C$	4) Reflexive property
5) $\triangle BEC \cong \triangle DFC$	5) ASA
6) $\overline{BC} \cong \overline{DC}$	6) CPCTC
7) ABCD is a rhombus	7) A parallelogram with $\cong$ adjacent sides is a rhombus

Quadrilateral Proofs

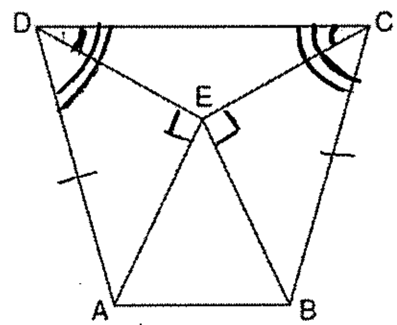
Given: Quadrilateral *ABCD* with diagonals $\overline{AC}$ and $\overline{BD}$ that bisect each other, and $\angle 1 \cong \angle 2$

Prove: $\triangle ACD$ is an isosceles triangle and $\triangle AEB$ is a right triangle



S	R
1) $\overline{AC}$ and $\overline{BD}$ bisect each other, $\angle 1 \cong \angle 2$	1) Given
2) ABCD is a parallelogram	2) A quad. whose diagonals bisect each other is a parallelogram
3) $\overline{AB} \parallel \overline{CD}$, $\overline{AD} \parallel \overline{BC}$	3) Opp sides of parallelogram are $\parallel$
4) $\angle 1 \cong \angle 4$, $\angle 2 \cong \angle 3$	4) Alt int $\angle$'s are $\cong$ when lines $\parallel$
5) $\angle 2 \cong \angle 4$	5) Transitive or Substitution
6) $\overline{AD} \cong \overline{CD}$	6) In a Δ, sides opp. $\cong$ $\angle$'s are $\cong$
7) ΔACD is isosceles	7) Def of isosceles Δ
8) ABCD is a rhombus	8) A parallelogram whose adjacent sides are $\cong$ is a rhombus
9) $\overline{BD} \perp \overline{AC}$	9) Diagonals of a rhombus $\perp$
10) $\angle BEA$ is a right $\angle$	10) $\perp$ lines form right $\angle$'s
11) ΔAEB is a right Δ	11) Def. of right Δ

Isosceles trapezoid $ABCD$ has bases $\overline{DC}$ and $\overline{AB}$ with nonparallel legs $\overline{AD}$ and $\overline{BC}$. Segments AE, BE, CE, and DE are drawn in trapezoid $ABCD$ such that $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$.



Prove $\triangle ADE \cong \triangle BCE$ and prove $\triangle AEB$ is an isosceles triangle.

S	R
1) Isosceles trapezoid ABCD $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, $\overline{BE} \perp \overline{CE}$	1) Given
2) $\overline{AD} \cong \overline{BC}$	2) Isos. trap. has 2 ≅ sides
3) $\angle CDA \cong \angle DCB$	3) Base ∠'s of isos trap ≅
4) $\angle ADE + \angle CDE \cong \angle BCE + \angle DCE$	4) Partition postulate
5) $\angle ADE \cong \angle BCE$	5) Subtraction
6) $\angle DEA$ + $\angle BEC$ are right ∠'s	6) ⊥ lines form right ∠'s
7) $\angle DEA \cong \angle BEC$	7) Right ∠'s are ≅
8) $\triangle ADE \cong \triangle BCE$	8) AAS
9) $\overline{AE} \cong \overline{BE}$	9) CPCTC
10) $\triangle AEB$ is an isosceles △	10) Def of isos. △