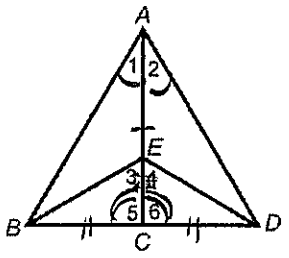
Honors Geometry Name_____

4.7 Proofs with Altitudes and Medians

1. Given: $\measuredangle 1 \cong \measuredangle 2; \measuredangle 5 \cong \measuredangle 6$

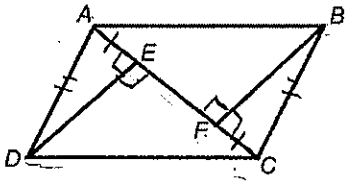
Prove: $\overline{EC}$ is an angle bisector of $\measuredangle BED$ in $\triangle BED$



Statements	Reasons
1. $\angle 1 \cong \angle 2$; $\angle 5 \cong \angle 6$	1. Given
2. $\overline{AC} \cong \overline{AC}$	2. Reflexive
3. $\triangle ABC \cong \triangle ADC$	3. ASA
4. $\overline{BC} \cong \overline{DC}$	4. CPCTC
5. $\overline{EC} \cong \overline{EC}$	5. Reflexive
6. $\triangle EBC \cong \triangle EDC$	6. SAS
7. $\angle 3 \cong \angle 4$	7. CPCTC
8. $\overline{EC}$ bis. $\angle BED$	8. def. $\angle$ bis.

2. Given: $\overline{DE}$ is an altitude, $\overline{BF}$ is an altitude
$\overline{AF} \cong \overline{EC}; \overline{AD} \cong \overline{BC}$

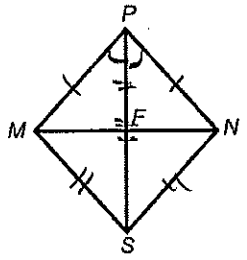
Prove: $\overline{AB} \cong \overline{DC}$



Statements	Reasons
1. $\overline{DE}$ is an Altitude; $\overline{BF}$ is an altitude	1. Given
2. $\overline{DE} \perp \overline{AC}$; $\overline{BF} \perp \overline{AC}$	2. def. Altitude
3. $\angle DEA$; $\angle BFC$; $\angle DEC$, $\angle BFA$ rt. $\angle$s	3. def. $\perp$
4. $AE+EF=AF$; $FC+EF=EC$	4. Seg. Add'n Post.
5. $\overline{AF} \cong \overline{EC}$; $\overline{AD} \cong \overline{BC}$	5. Given
6. $AF=EC$	6. def. $\cong$
7. $AE+EF=FC+EF$	7. Subst.
8. $EF=EF$	8. Reflex.
9. $AE=FC$	9. subtr.
10. $\overline{AE} \cong \overline{FC}$	10. def. $\cong$
11. $\triangle AED$ & $\triangle CFB$ rt. $\triangle$s	11. def. rt. $\triangle$
12. $\triangle AED \cong \triangle CFB$	12. HL
13. $DE \cong BF$	13. CPCTC
14. $\angle DEC \cong \angle BFA$	14. All rt. $\angle$s $\cong$
15. $\triangle DEC \cong \triangle BFA$	15. SAS
16. $\overline{AB} \cong \overline{DC}$	16. CPCTC

3. Given: $\overline{MP} \cong \overline{NP}, \overline{MS} \cong \overline{NS}$

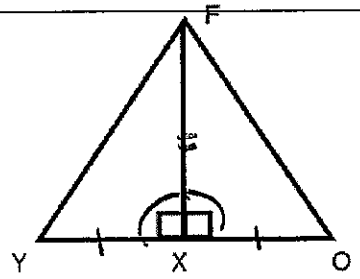
Prove: $\overline{MF} \cong \overline{NF}$



Statements	Reasons
1. $\overline{MP} \cong \overline{NP}$, $\overline{MS} \cong \overline{NS}$	1. Given
2. $\overline{PS} \cong \overline{PS}$	2. Reflexive
3. $\triangle MPS \cong \triangle NPS$	3. SSS
4. $\angle MPF \cong \angle NPF$	4. CPCTC
5. $\overline{PF} \cong \overline{PF}$	5. Reflexive
6. $\triangle MPF \cong \triangle NPF$	6. SAS
7. $\overline{MF} \cong \overline{NF}$	7. CPCTC

4. Given: $\overline{FX}$ is an altitude; $\overline{FX}$ is a median

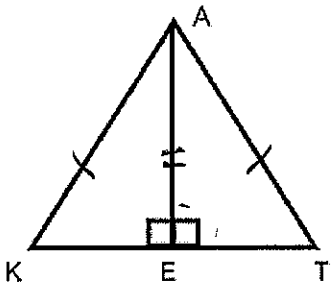
Prove: $\triangle YFO$ is isosceles



Statements	Reasons
1. $\overline{FX}$ is an alt.; $\overline{FX}$ is a median	1. Given
2. $\overline{FX} \perp \overline{YO}$	2. def. Altitude
3. $\angle FXY \cong \angle FXO$	3. $\perp$ lines → $\cong$ adj. $\angle$s
4. $\overline{YX} \cong \overline{OX}$	4. def. median
5. $\overline{FX} \cong \overline{FX}$	5. Reflexive
6. $\triangle FXY \cong \triangle FXO$	6. SAS
7. $\overline{FY} \cong \overline{FO}$	7. CPCTC
8. $\triangle YFO$ is isosceles	8. def. isosceles $\triangle$

5. Given: $\overline{AE}$ is an altitude; $\triangle KAT$ is isosceles with vertex A

Prove: $\overrightarrow{AE}$ is an angle bisector of $\angle KAT$



Statements	Reasons
1. $\overline{AE}$ is an altitude; ΔKAT is isosc.	1. Given
2. $\overline{AE} \perp \overline{KT}$	2. def. Alt.
3. $\overline{AK} \cong \overline{AT}$	3. def. isosc. Δ
4. $\angle AEK$, $\angle AET$ rt. $\angle$s	4. def. $\perp$
5. ΔAEK + ΔAET rt. Δs	5. def. rt. Δ
6. $\overline{AE} \cong \overline{AE}$	6. Reflexive
7. $\Delta AEK \cong \Delta AET$	7. HL
8. $\angle KAE \cong \angle TAE$	8. CPCTC
9. $\overline{AE}$ bisects $\angle KAT$	9. def. $\angle$ bis.