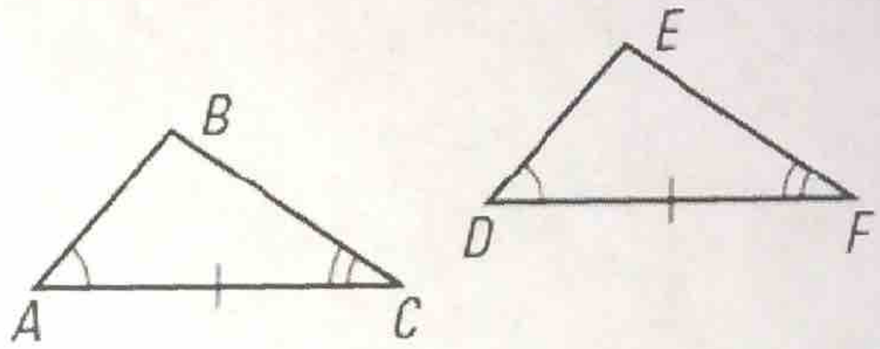
4.5 Prove Triangles Congruent by ASA and AAS

THEOREMS *For Your Notebook*

POSTULATE 21 Angle-Side-Angle (ASA) Congruence Postulate

If two angles and the included side of one triangle are congruent to two angles and the included side of a second triangle, then the two triangles are congruent.

If Angle $\angle A \cong \angle D$,
Side $\overline{AC} \cong \overline{DF}$, and
Angle $\angle C \cong \angle F$,
then $\triangle ABC \cong \triangle DEF$.

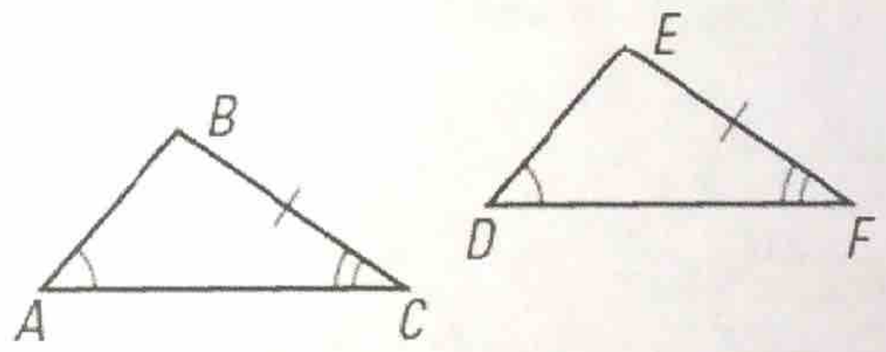


THEOREM 4.6 Angle-Angle-Side (AAS) Congruence Theorem

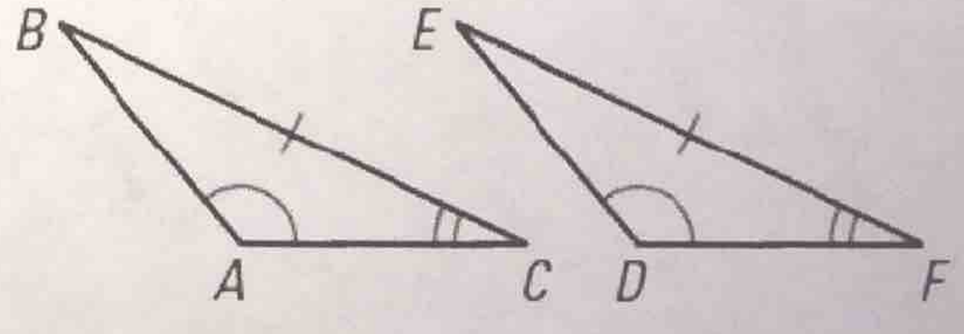
If two angles and a non-included side of one triangle are congruent to two angles and the corresponding non-included side of a second triangle, then the two triangles are congruent.

If Angle $\angle A \cong \angle D$,
Angle $\angle C \cong \angle F$, and
Side $\overline{BC} \cong \overline{EF}$,
then $\triangle ABC \cong \triangle DEF$.

Proof: Example 2, p. 250



Ex 1: Prove the Angle-Angle-Side (AAS) Congruence Theorem (NO FLOW PROOFS)

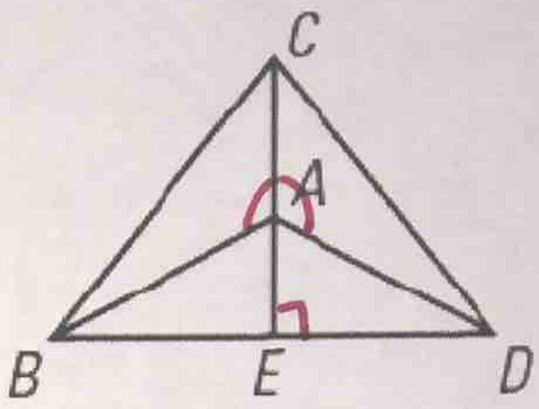


GIVEN ▶ $\angle A \cong \angle D$, $\angle C \cong \angle F$, $\overline{BC} \cong \overline{EF}$

PROVE ▶ $\triangle ABC \cong \triangle DEF$

STATEMENTS	REASONS
1. $\angle A \cong \angle D$, $\angle C \cong \angle F$, $\overline{BC} \cong \overline{EF}$	1. Given
2. $\angle B \cong \angle E$	2. Third Angles Theorem
3. $\triangle ABC \cong \triangle DEF$	3. ASA

Ex 2: In diagram $\overline{CE} \perp \overline{BD}$ and $\angle CAB \cong \angle CAD$. Prove $\Delta ABE \cong \Delta ADE$. (NO FLOW PROOFS)

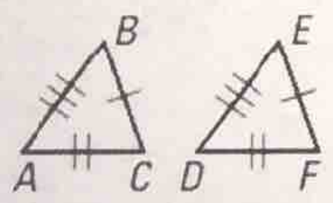
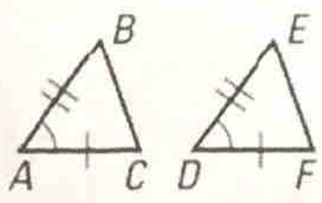
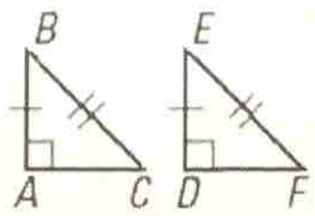
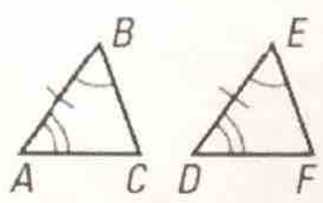
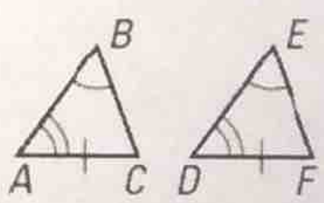


STATEMENTS	REASONS
1. $\overline{CE} \perp \overline{BD}$, $\angle CAB \cong \angle CAD$	1. Given
2. $\angle BAE$ & $\angle CAB$ are supplements	2. Definition of Supplementary Angles
(A) 3. $\angle DAE$ & $\angle CAD$ are supplements	3. Congruent Supplements Theorem
(S) 4. $\overline{AE} \cong \overline{AE}$	4. Reflexive Property
5. $m\angle AEB = m\angle AED = 90°$	5. Definition of Perpendicular Lines
(A) 6. $\angle AEB \cong \angle AED$	6. All right angles are congruent
7. $\Delta ABE \cong \Delta ADE$	7. ASA

CONCEPT SUMMARY — For Your Notebook

Triangle Congruence Postulates and Theorems

You have learned five methods for proving that triangles are congruent.

SSS	SAS	HL (right △ only)	ASA	AAS
				
All three sides are congruent.	Two sides and the included angle are congruent.	The hypotenuse and one of the legs are congruent.	Two angles and the included side are congruent.	Two angles and a (non-included) side are congruent.

In the Exercises, you will prove three additional theorems about the congruence of right triangles: **A**ngle-**L**eg, **L**eg-**L**eg, and **H**ypotenuse-**A**ngle.