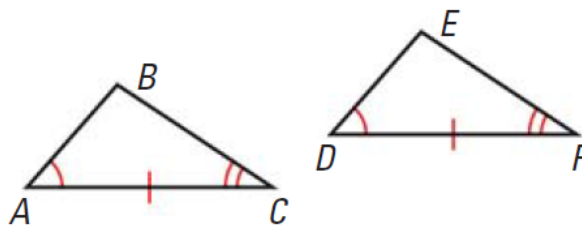# Unit 8.4 Prove Triangles Congruent by ASA and AAS NOTES

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.
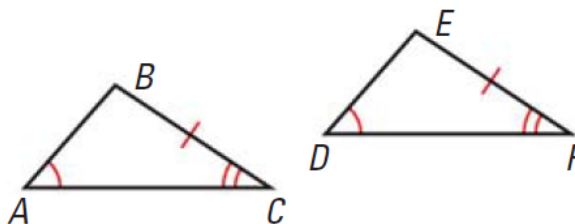
If **Angle** $\angle A \cong \angle D,$

    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 $\overline{BC} \cong \overline{EF},$

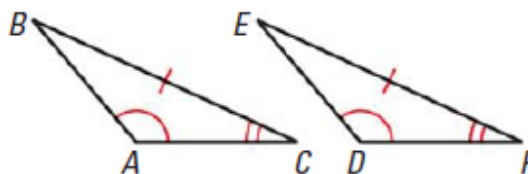then $\triangle ABC \cong \triangle DEF.$

FLOW PROOFS You have written two-column proofs and paragraph proofs. A **flow proof** uses arrows to show the flow of a logical argument. Each reason is written below the statement it justifies.

EXAMPLE 2   Prove the AAS Congruence Theorem

Prove the Angle-Angle-Side Congruence Theorem.

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

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

| $\angle A \cong \angle D$ | $\angle B \cong \angle E$ |
| Given | Third ⩬ Thm. |

| $\angle C \cong \angle F$ | $\triangle ABC \cong \triangle DEF$ |
| Given | ASA Congruence Post. |

$\overline{BC} \cong \overline{EF}$
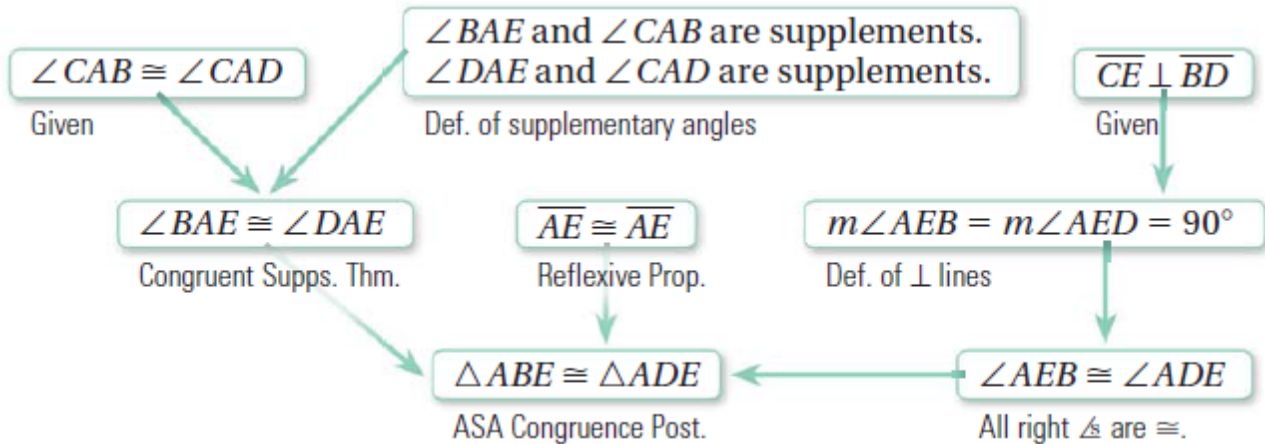Given

EXAMPLE 3 Write a flow proof

In the diagram, $\overline{CE} \perp \overline{BD}$ and $\angle CAB \cong \angle CAD$.
Write a flow proof to show $\triangle ABE \cong \triangle ADE$.
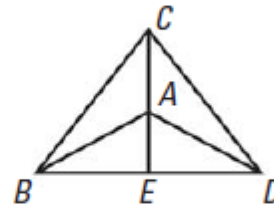
Solution

GIVEN ▶ $\overline{CE} \perp \overline{BD}$, $\angle CAB \cong \angle CAD$
PROVE ▶ $\triangle ABE \cong \triangle ADE$

$\angle CAB \cong \angle CAD$	$\angle BAE$ and $\angle CAB$ are supplements. $\angle DAE$ and $\angle CAD$ are supplements.	$\overline{CE} \perp \overline{BD}$
Given	Def. of supplementary angles	Given

$\angle BAE \cong \angle DAE$	$\overline{AE} \cong \overline{AE}$	$m\angle AEB = m\angle AED = 90°$
Congruent Supps. Thm.	Reflexive Prop.	Def. of $\perp$ lines

$\triangle ABE \cong \triangle ADE$	$\angle AEB \cong \angle AED$
ASA Congruence Post.	All right $\triangle$ are $\cong$.

Triangle Congruence Postulates and Theorems

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

SSS	SAS	HL (right $\triangle$ 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.

NOTE: Remember that there is no SSA Postulate or Theorem.