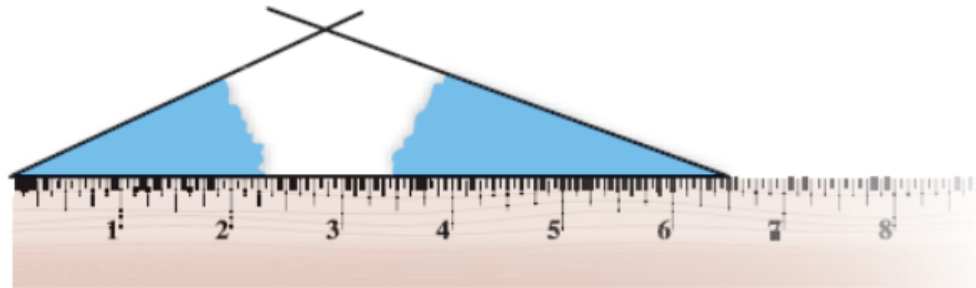


4.5

Prove Triangles Congruent by ASA and AAS

Goal • Use two more methods to prove congruences.

Suppose you tear two angles out of a piece of paper and place them at a fixed distance on a ruler. Can you form more than one triangle with a given length and two given angle measures as shown below?

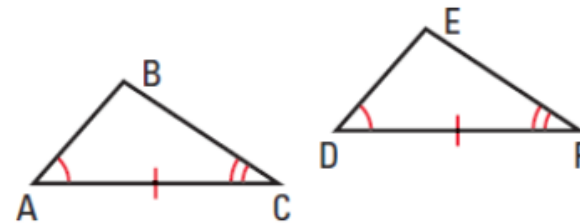


In a polygon, the side connecting the vertices of two angles is the *included* side. Given two angle measures and the length of the included side, you can make only one triangle. So, all triangles with those measurements are congruent.

THEOREMS*For Your Notebook***POSTULATE 21 Angle-Side-Angle (ASA) Congruence Postulate**

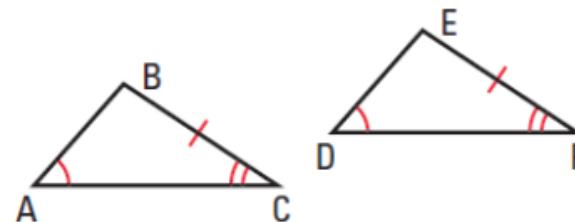
If two angles and the included side of one triangle are congruent to two angles and the included side of a second triangle, then the two triangles are congruent.

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.

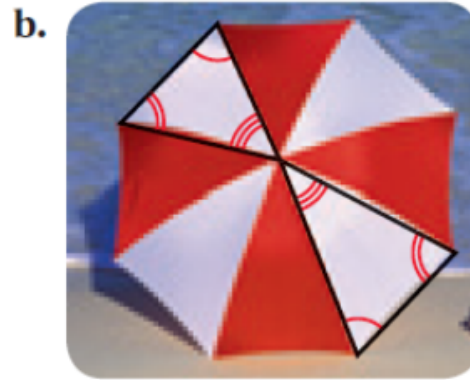
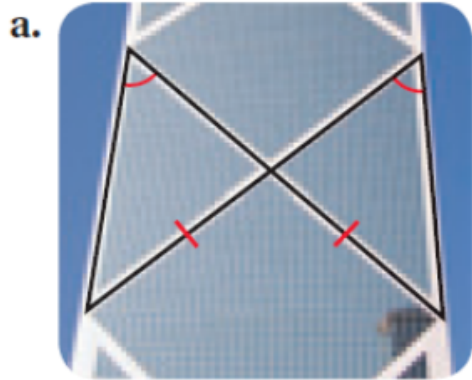
If **Angle** $\angle A \cong \angle D$,
Angle $\angle C \cong \angle F$, and
Side $\overline{BC} \cong \overline{EF}$,
 then $\triangle ABC \cong \triangle DEF$.



Proof: Example 2, p. 250

EXAMPLE 1 Identify congruent triangles

Can the triangles be proven congruent with the information given in the diagram? If so, state the postulate or theorem you would use.



Flow Proofs

*We have used two-column proofs and paragraph proofs. Another way to prove is by a FLOW PROOF.

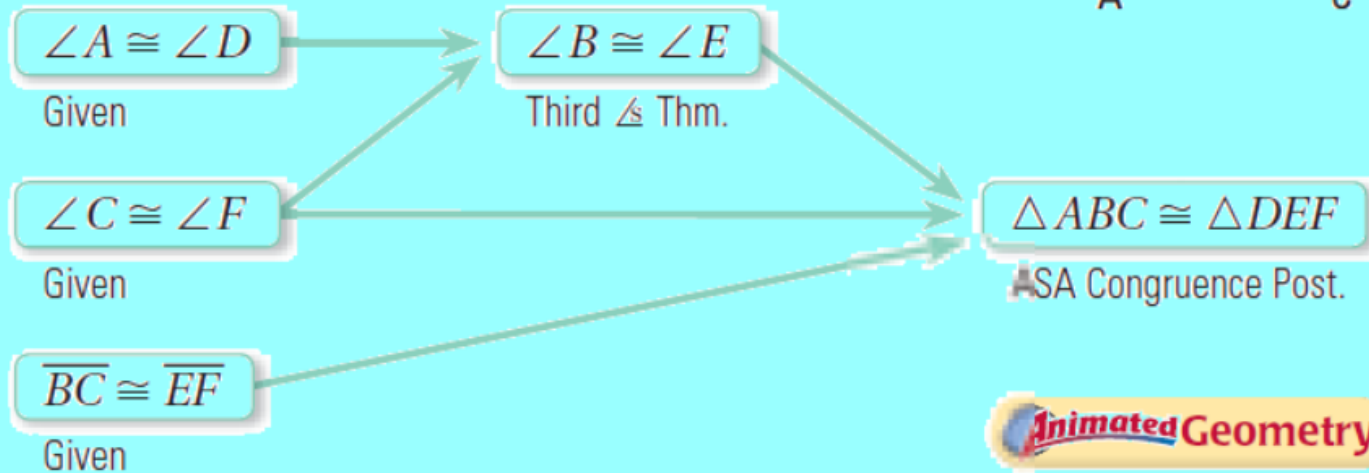
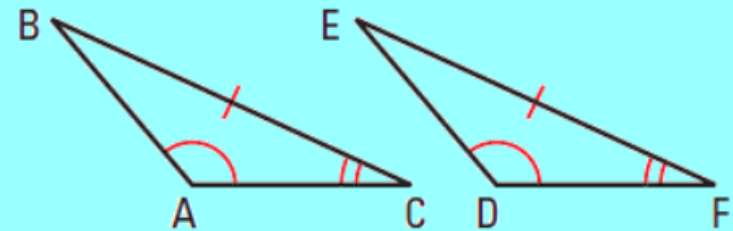
A flow proof uses arrows to show the flow of the logical argument. Each reason is written below the statement it justifies.

EXAMPLE 2 Prove the AAS Congruence Theorem

Prove the Angle-Angle-Side Congruence Theorem.

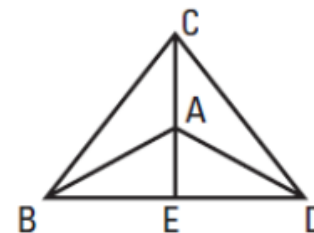
GIVEN $\angle A \cong \angle D$, $\angle C \cong \angle F$,
 $\overline{BC} \cong \overline{EF}$

PROVE $\triangle ABC \cong \triangle DEF$



EXAMPLE 3 Write a flow proof

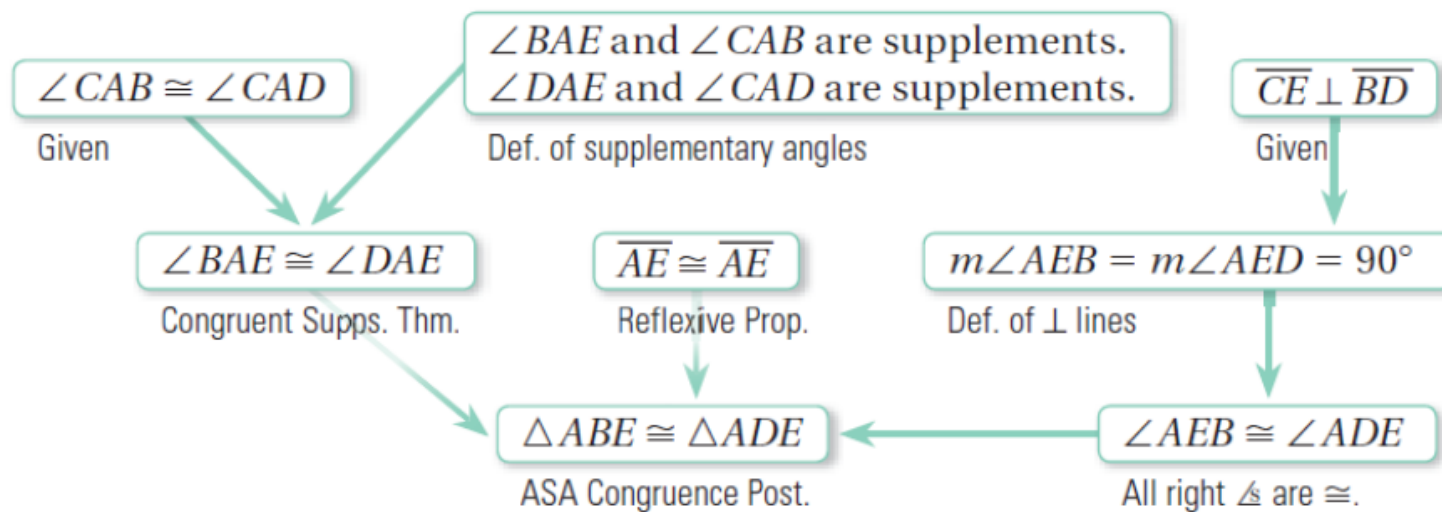
In the diagram, $\overline{CE} \perp \overline{BD}$ and $\angle CAB \cong \angle CAD$.
Write a flow proof to show $\triangle ABE \cong \triangle ADE$.



Solution

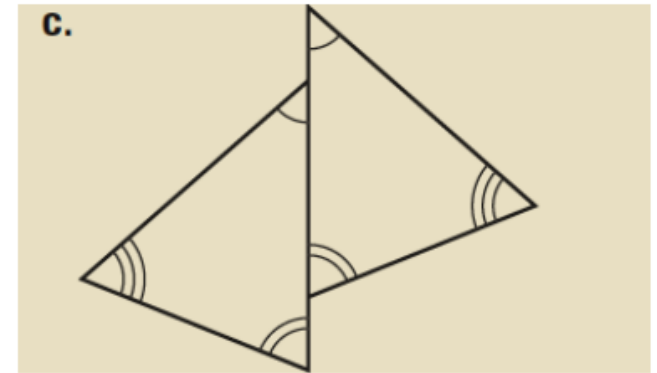
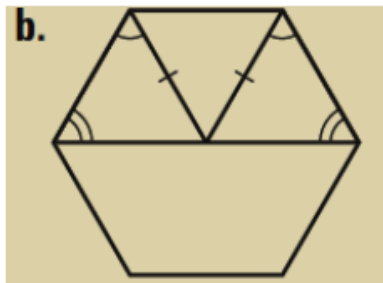
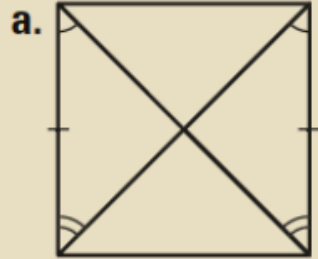
GIVEN $\triangleright \overline{CE} \perp \overline{BD}$, $\angle CAB \cong \angle CAD$

PROVE $\triangleright \triangle ABE \cong \triangle ADE$



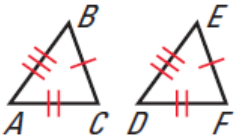
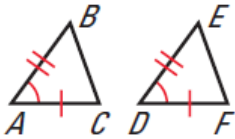
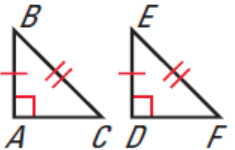
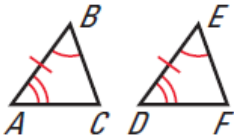
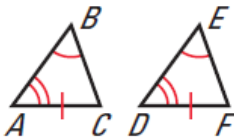
Extra Example 1

Can the triangles be proven congruent with the information given in the diagram? If so, state the postulate or theorem you would use.



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 \triangle only)	ASA	AAS
 <p>All three sides are congruent.</p>	 <p>Two sides and the included angle are congruent.</p>	 <p>The hypotenuse and one of the legs are congruent.</p>	 <p>Two angles and the included side are congruent.</p>	 <p>Two angles and a (non-included) side are congruent.</p>

In the Exercises, you will prove three additional theorems about the congruence of right triangles: **Angle-Leg**, **Leg-Leg**, and **Hypotenuse-Angle**.

Tomorrow

Day 1

Assignment:

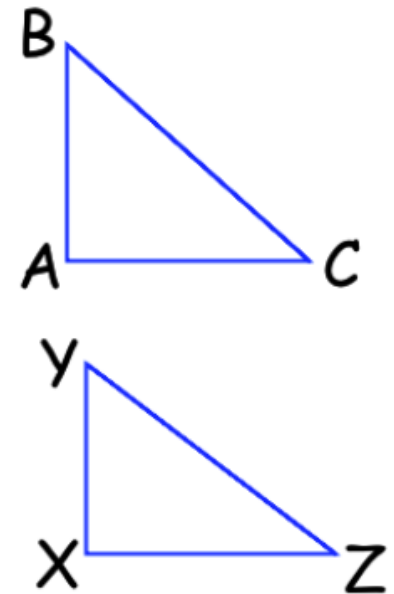
4.5 ws

28. Leg-Leg (LL) Theorem If the legs of two right triangles are congruent, then the triangles are congruent.

Given: $AB \cong XY$; $AC \cong XZ$; $\angle A$ & $\angle X$ are right angles

Prove: $\triangle ABC \cong \triangle XYZ$

Statements	Reasons



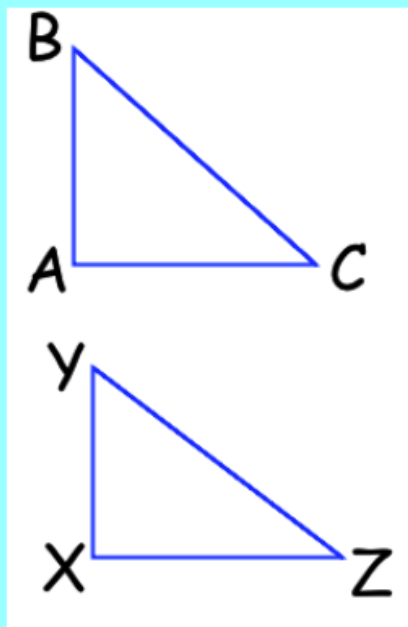
This is a special form of _____

29. Angle-Leg (AL) Theorem If an angle and a leg of a right triangle are congruent to an angle and a leg of a second right triangle, then the triangles are congruent.

Given: $\angle B \cong \angle Y$; $\overline{AB} \cong \overline{XY}$; $\angle A$ & $\angle X$ are right angles

Prove: $\triangle ABC \cong \triangle XYZ$

Statements	Reasons

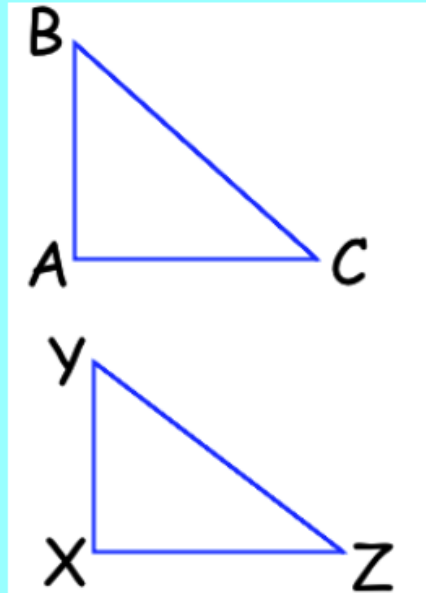


This is a special form of _____

30. Hypotenuse-Angle (HA) Theorem If an angle and the hypotenuse of a right triangle are congruent to an angle and the hypotenuse of a second right triangle, then the triangles are congruent.

Given: $\angle B \cong \angle Y$; $\overline{BC} \cong \overline{YZ}$; $\angle A$ & $\angle X$ are right angles

Prove: $\triangle ABC \cong \triangle XYZ$



This is a special form of _____

Statements	Reasons

Day 2 Assignment:

p. 252 (1-20, 31-34,
36-43)