What You Will Learn

▶ Use the ASA and AAS Congruence Theorems.

Theorem 5.10   Angle-Side-Angle (ASA) Congruence Theorem

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 $\angle A \cong \angle D$, $\overline{AC} \cong \overline{DF}$, and $\angle C \cong \angle F$, then $\triangle ABC \cong \triangle DEF$.
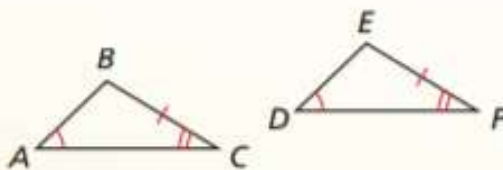
Proof p. 270

SAA

Theorem 5.11 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.
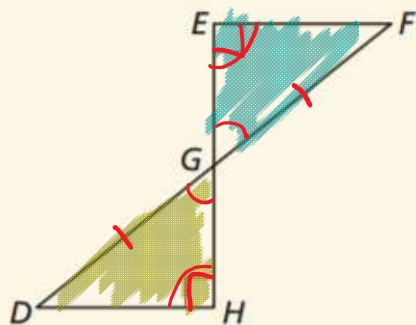
If $\angle A \cong \angle D$, $\angle C \cong \angle F$,
and $\overline{BC} \cong \overline{EF}$, then
$\triangle ABC \cong \triangle DEF$.

ASA   SSS

SAS   SAA or AAS

~~SSA~~
HL

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

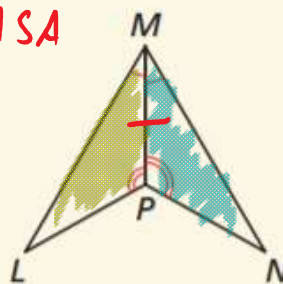a. $\triangle EFG$ and $\triangle HDG$

yes by SAA or AAS

b. $\triangle PQM$ and $\triangle RQM$

SSA   yes

No, can't Prove
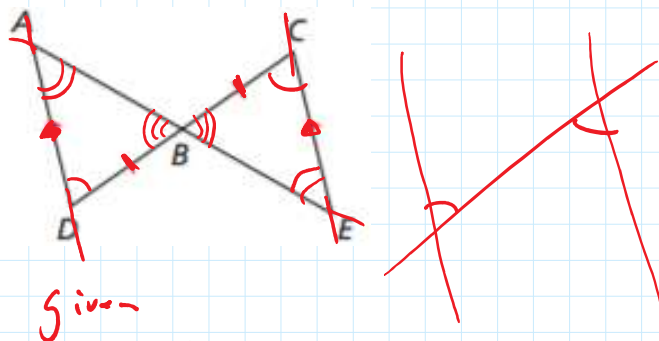
c. $\triangle LMP$ and $\triangle NMP$

yes, ASA

Write a proof.

Given $\overline{AD} \parallel \overline{EC}$, $\overline{BD} \cong \overline{BC}$

Prove $\triangle ABD \cong \triangle EBC$
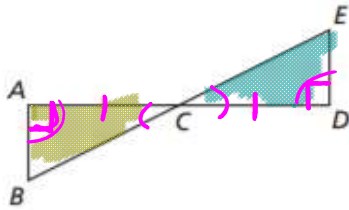
SOLUTION

$\overline{AD} \parallel \overline{EC}$

Given

$\overline{AD} \parallel \overline{EC}$ — given

$\angle D \cong \angle C$ — Alt. Int. $\angle$s

$\angle A \cong \angle E$ — Alt. Int. $\angle$s

$\overline{DD} \cong \overline{BC}$ — given

$\angle ABD \cong \angle CBE$ — Vert. $\angle$s

$\triangle ABD \cong \triangle EBC$ — ASA or AAS or SAA ~~AAA~~

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2. In the diagram, $\overline{AB} \perp \overline{AD}, \overline{DE} \perp \overline{AD}$, and $\overline{AC} \cong \overline{DC}$. Prove $\triangle ABC \cong \triangle DEC$.

$\overline{AB} \perp \overline{AD}$ — Given

$\overline{DE} \perp \overline{AD}$ — given

$\angle A \cong \angle D$ — Def. $\perp$

$\overline{AC} \cong \overline{DC}$ — given

$\angle ACB \cong \angle ECD$ — Vert. $\angle$s
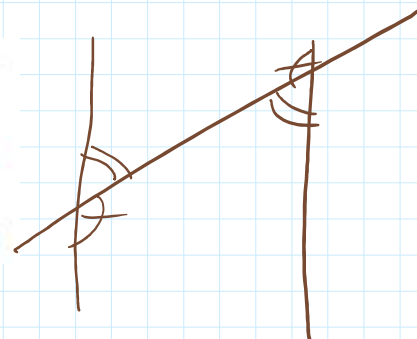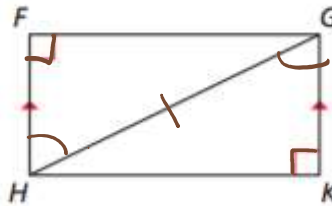
$\triangle ABC \cong \triangle DEC$ — ASA

Write a proof.

Given $\overline{HF} \parallel \overline{GK}$, $\angle F$ and $\angle K$ are right angles.

Prove $\triangle HFG \cong \triangle GKH$

$\overline{HF} \parallel \overline{GK}$ — Given

$\angle FHG \cong \angle HGK$ — Alt. Int. $\angle$s

$\angle F$ and $\angle K$ are Right $\angle$s — Given

$\angle F \cong \angle K$ — Def. of Right $\angle$s

$\angle F \cong \angle K$

$\overline{GH} \cong \overline{GH}$
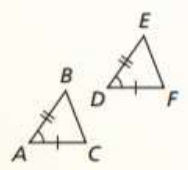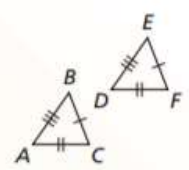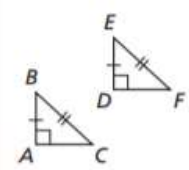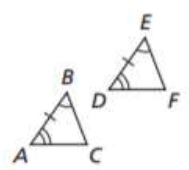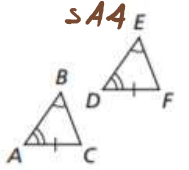
$\triangle HFG \cong \triangle GKH$

D.f. of Right $\angle$s

Reflexive P.o.C

AAS

Triangle Congruence Theorems

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

SAS	SSS	HL (right △ only)	ASA	AAS
				or SAA
Two sides and the included angle are congruent.	All three sides 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.

SSA

Practice sec 5.6 pg. 274: 2-12A, 17, 19