Lesson 5.4 Proving Triangles Congruent ASA and AAS

Sunday, January 22, 2023   4:43 PM

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Lesson 5.4
Proving

Lesson 5.4 Proving Triangles Congruent: ASA, AAS

Workbook pages 303-306

McGraw Hill

Content Objective
Students will use ASA and AAS to prove triangles congruent.

Florida's B.E.S.T. Standards for Mathematics

MA.912.GR.1.2 Prove triangle congruence or similarity using Side-Side-Side, Side-Angle-Side, Angle-Side-Angle, Angle-Angle-Side, Angle-Angle and Hypotenuse-Leg.

MA.912.GR.1.3 Prove relationships and theorems about triangles. Solve mathematical and real-world problems involving postulates, relationships and theorems of triangles.

MA.912.GR.1.6 Solve mathematical and real-world problems involving congruence or similarity in two-

Learn
Proving Triangles Congruent: ASA

Theorem

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 $\triangle ABC \cong \triangle DEF$.
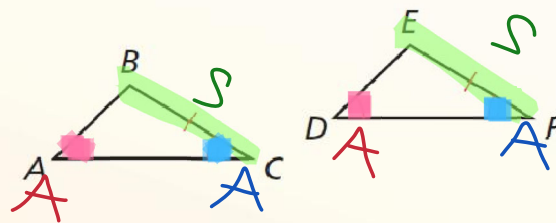
Proof p. 270
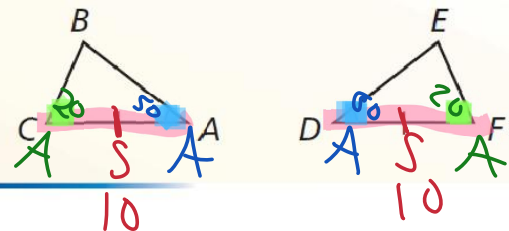
Theorem

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 $\triangle ABC \cong \triangle DEF$.
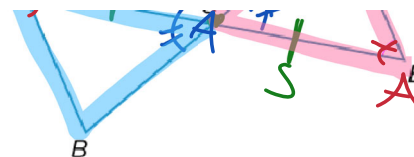
Proof p. 271

Example 1
Use ASA to Prove Triangles Congruent
Write a proof.

Given: $\angle BAC \cong \angle DEC$; $\overline{BD}$ bisects $\overline{AE}$.
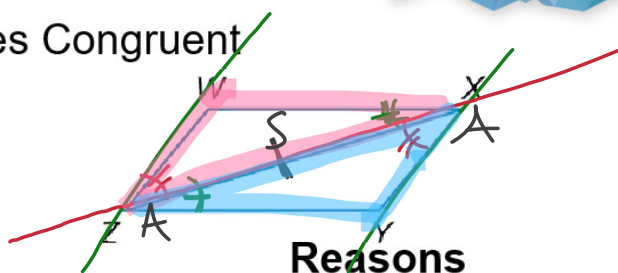
Prove: $\triangle ACB \cong \triangle ECD$

Statements	Reasons
1. $\angle BAC \cong \angle DEC$	1. Given
2. $\overline{BD}$ bisects $\overline{AE}$.	2. Given
3. $AC = EC$	3. Definition of segment bisector
4. $\angle ACB \cong \angle ECD$	4. Vertical Angles
5. $ACB = ECD$	5. ASA

Example 1
Use ASA to Prove Triangles Congruent
Complete the proof.

Given: $\overline{WX} \parallel \overline{YZ}$ and $\overline{WZ} \parallel \overline{YX}$

Prove: $\triangle WXZ \cong \triangle YZX$

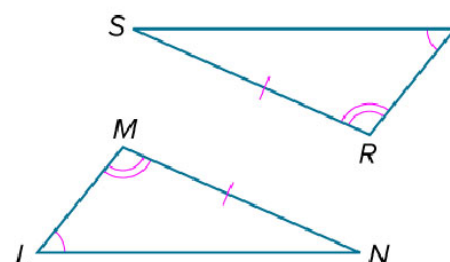| Statements	Reasons
1. $WX \parallel YZ$	1. Given
2. $\overline{WZ} \parallel \overline{YX}$	2. Given
3. $\angle WXZ \cong \angle YZX$	3. Alternate Interior Angles
4. $WZX = YXZ$	4. Alternate Interior Angles Theorem
5. $XZ = XZ$	5. Reflexive Property of Congruence
6. $\triangle WXZ \cong \triangle YZX$	6. ASA

Learn
Proving Triangles Congruent: AAS

The proof of the AAS Congruence Theorem is on the next slide.

Given: $\angle L \cong \angle Q$

$\angle M \cong \angle R$

$\overline{MN} \cong \overline{RS}$

Prove: $\triangle LMN \cong \triangle QRS$

Learn
Proving Triangles Congruent: AAS

Proof:

$\angle L \cong \angle Q$
Given

$\angle N = \angle S$

Third Angles Theorem

$\angle R = \angle M$
Given

$\triangle LMN \cong \triangle QRS$

AAS

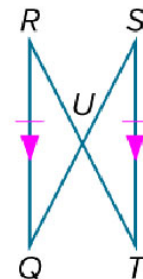| $\overline{MN} \cong \overline{RS}$ |
| --- |
| Given |
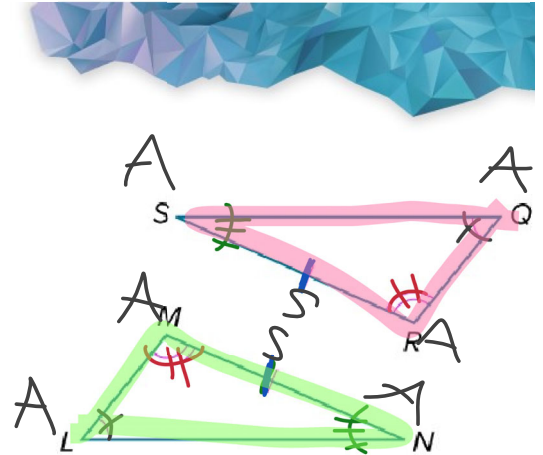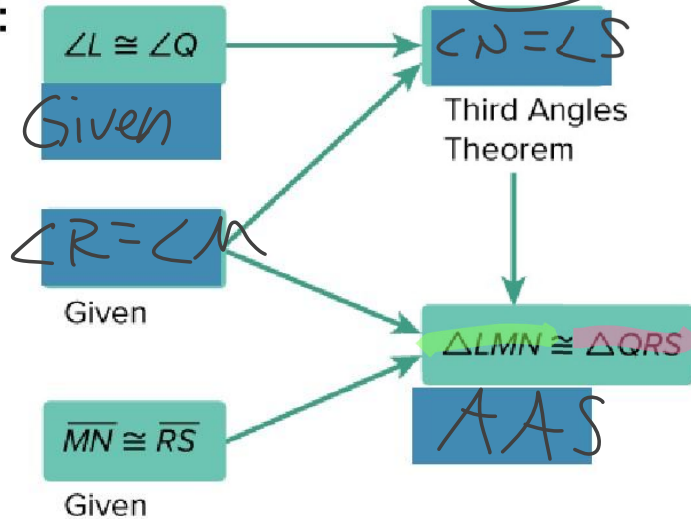
Example 3
Use AAS to Prove Triangles Congruent

Write a proof.

Given: $\overline{RQ} \cong \overline{ST}$ and $\overline{RQ} \parallel \overline{ST}$

Prove: $\triangle RUQ \cong \triangle TUS$

Example 3
Use AAS to Prove Triangles Congruent

RQ ||TS

RQ ||TS
Given

→ ∠RQS ≅ ∠TSQ

Alt. Int ∠'s

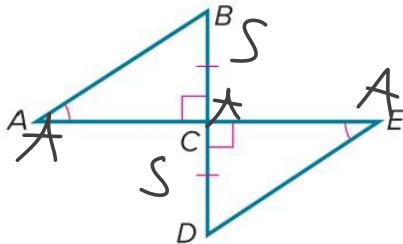| RQ ≅ ST |
| --- |
| Given |

∠RUQ ≅ ∠TUS

Vertical angles
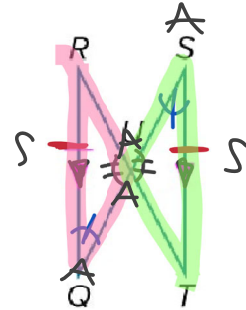
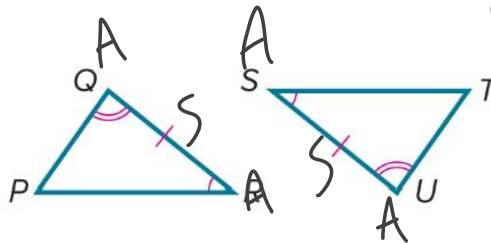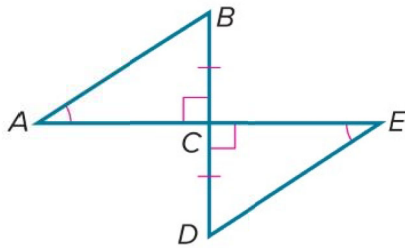△RUQ ≅ △TUS

AAS

Exit Ticket

Which congruence criterion would you use to prove the two triangles congruent?
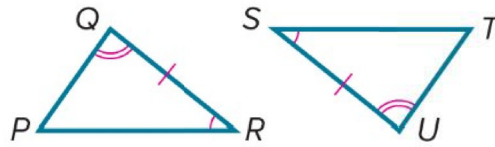
1. AAS

2. ASA

Exit Ticket

Which congruence criterion would you use to prove the two triangles congruent?
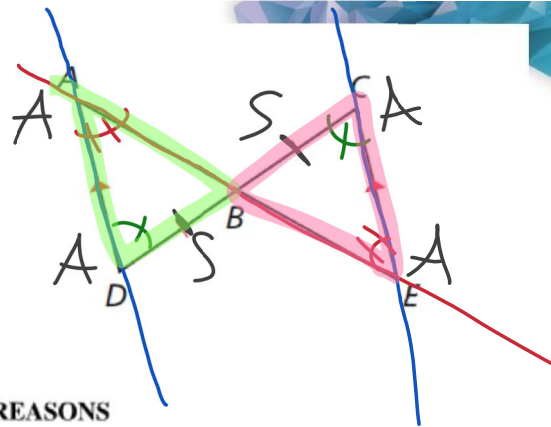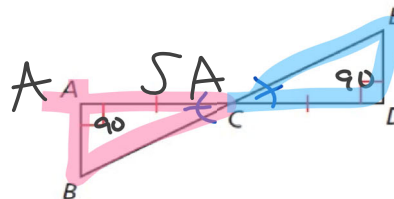
1. AAS

2. ASA

Write a proof.

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

Prove $\triangle ABD \cong \triangle EBC$

STATEMENTS	REASONS
① $AD \parallel EC$ & $BD = BC$	Given
② $\angle ADC = \angle ECD$	Alternate Int $\angle$'s
③ $\angle DAE = \angle CEA$	Alt. Int. $\angle$'s
④ $\triangle ABD = \triangle EBC$	AAS

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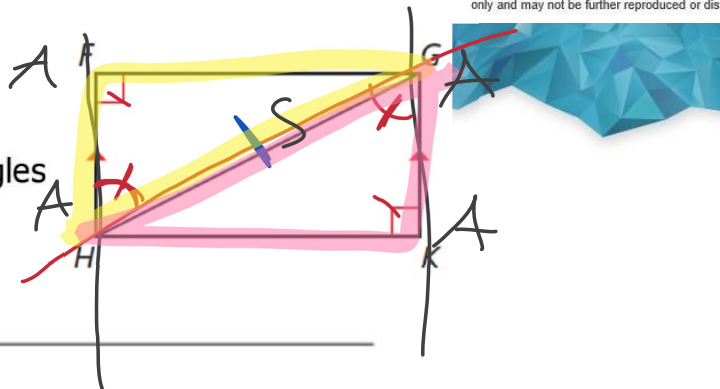

STATEMENTS	REASONS
1. $\overline{AB} \perp \overline{AD}$, $\overline{DE} \perp \overline{AD}$, $\overline{AC} \cong \overline{DC}$	1. Given
2. $\angle BAC$ and $\angle EDC$ are right angles.	2. definition of perpendicular
3. $\angle A = \angle D$	3. Right Angles Congruence Theorem (Thm. 2.3)
4. $\angle ACB = DEC$	4. Vertical angles

5. $\triangle ABC \cong \triangle DEC$ 5. ASA

Write a proof.

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

Prove $\triangle HFG \cong \triangle GKH$

STATEMENTS	REASONS
1. $\overline{HF} \parallel \overline{GK}$	1. Given
2. $\angle GHF \cong \angle HGK$	2. Alternate Interior Angles Theorem (Theorem 3.2)
3. $\angle F$ and $\angle K$ are right angles.	3. all Right $\angle$'s $\cong$
4. $\angle F \cong \angle K$	4. Right Angles Congruence Theorem (Theorem 2.3)
5. $HG \cong HG$	5. Reflexive Prop
6. $\triangle HFG \cong \angle GKH$	6. AAS