Proving Triangles Congruent 5.3 & 5.4

Tuesday, December 10, 2024 8:45 PM

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Proving Triangles ...

Module 5:
Lesson 5-3 and 5-4
Proving Triangles Congruent: SSS, SAS, ASA, AAS

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

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-dimensional figures.

Lesson Objectives

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

Content Objective
Students will use SSS and SAS to prove triangles congruent.

McGraw Hill | Proving Triangles Congruent: ASA, AAS

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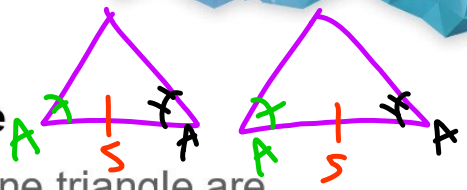
Learn

Proving Triangles Congruent: ASA



Angle-Side-Angle (ASA) Congruence

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

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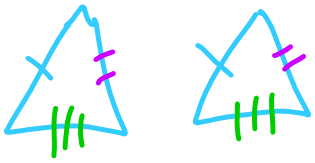

Side-Side-Side (SSS) Congruence

If three sides of one triangle are congruent to three sides of a second triangle, then the triangles are congruent.

Students, draw anywhere on this slide!

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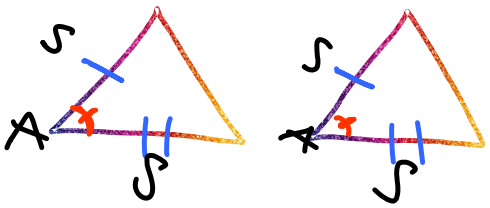
Proving Triangles Congruent: SAS

Postulate 5.2: Side-Angle-Side (SAS) Congruence

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



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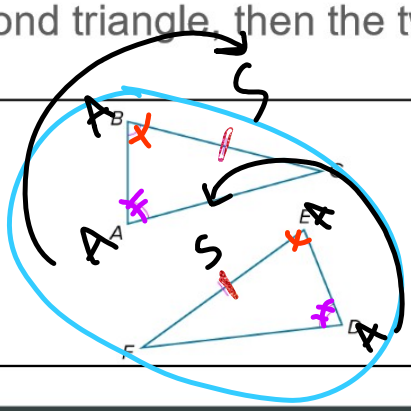
Proving Triangles Congruent: AAS

Theorem 5.5: Angle-Angle-Side (AAS) Congruence

	If two angles and the nonincluded side of one triangle are congruent to the corresponding two angles and

Words	If two angles and the nonincluded side of one triangle are congruent to the corresponding two angles and nonincluded side of a second triangle, then the two triangles are congruent.
Example	If $\angle A \cong \angle D$, $\angle B \cong \angle E$, and $\overline{BC} \cong \overline{EF}$, then $\triangle ABC \cong \triangle DEF$.



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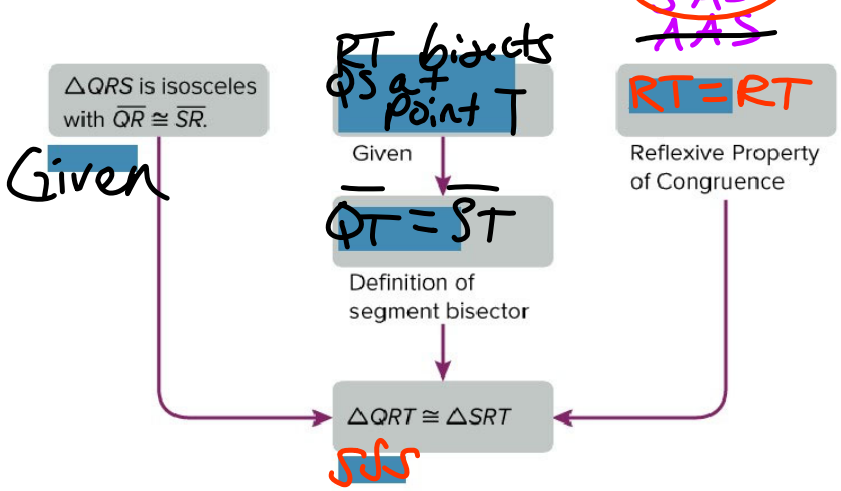
Example 1

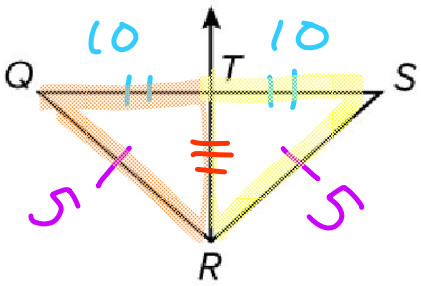
Use SSS to Prove Triangles Congruent

Given: $\triangle QRS$ is isosceles with $\overline{QR} \cong \overline{SR}$. $\overrightarrow{RT}$ bisects $\overline{QS}$ at point T.

Prove: $\triangle QRT \cong \triangle SRT$

ASA
SSS
SAS
AAS





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Example 1

Use SSS to Prove Triangles Congruent

Check

SAS

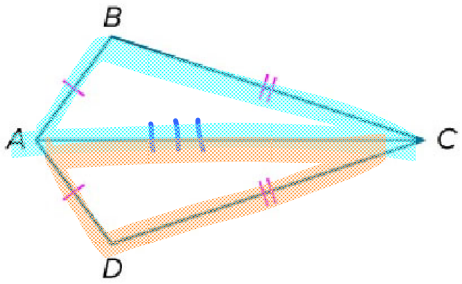
Check

Complete the proof.

Given: $\overline{AB} \cong \overline{AD}$ and $\overline{BC} \cong \overline{DC}$

Prove: $\triangle ABC \cong \triangle ADC$

SAS
~~ASA~~
SSS
~~AAS~~



Statements	Reasons
1. $\overline{AB} \cong \overline{AD}$ and $\overline{BC} \cong \overline{DC}$	1. Given
2. $AC = AC$	2. Reflexive
3. $\triangle ABC \cong \triangle ADC$	3. SSS

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Example 1

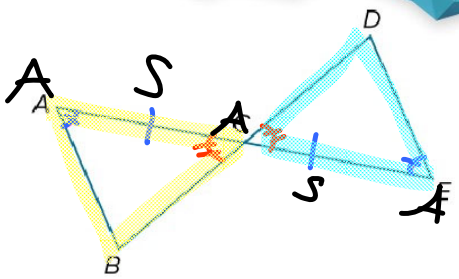
Use ASA to Prove Triangles Congruent

Write a proof.

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

Prove: $\triangle ACB \cong \triangle ECD$

SSS ASA
SAS AAS



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 $\cong$
5. $\triangle ACB \cong \triangle ECD$	5. ASA

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Example 1

Use ASA to Prove Triangles Congruent

Check

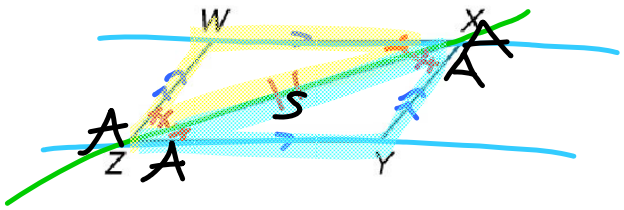
Use ASA to Prove Triangles Congruent

Check

Complete the proof.

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

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



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

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Example 1

Use ASA to Prove Triangles Congruent

Statements	Reasons
1.	1. Given
2. $\overline{WZ} \| \overline{YX}$	2.
3. $\angle WXZ \cong \angle YZX$	3.
4.	4. Alternate Interior Angles Theorem
5.	5. Reflexive Property of Congruence
6. $\triangle WXZ \cong \triangle YZX$	6.

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Proving Triangles Congruent: AAS

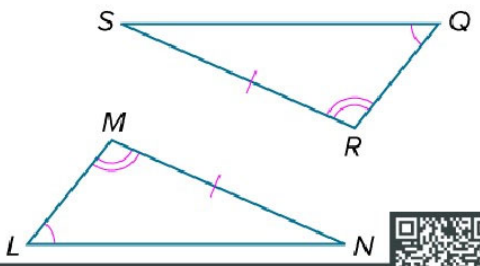
The proof of the AAS Congruence Theorem is on the next slide.

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

$\angle M \cong \angle R$

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

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



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Proving Triangles Congruent: AAS

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

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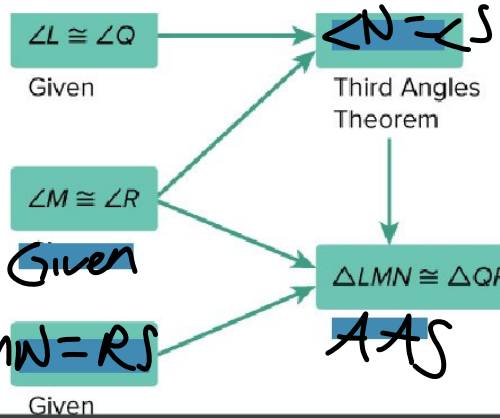
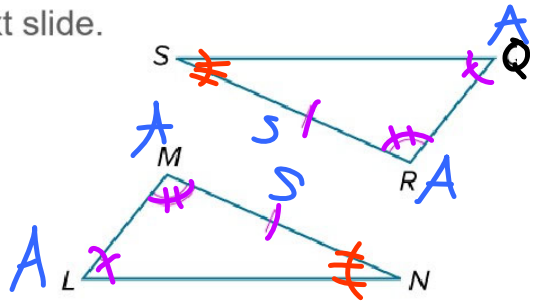
$\overline{MN} \cong \overline{RS}$

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

AAS





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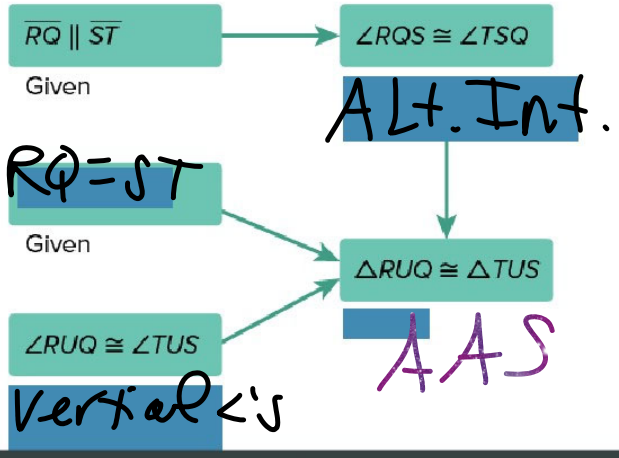
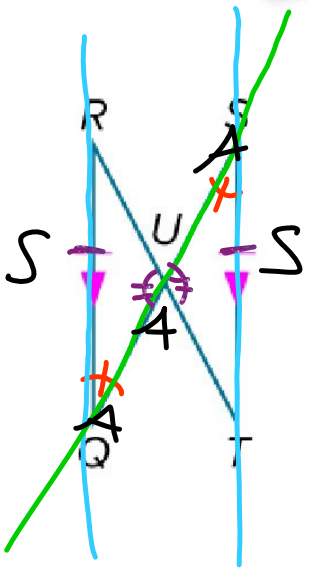
Example 3
Use AAS to Prove Triangles Congruent

Given: $\overline{RQ} \cong \overline{ST}$ and $\overline{RQ} \parallel \overline{ST}$
Prove: $\triangle RUQ \cong \triangle TUS$





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Example 3
Use SAS to Prove Triangles Congruent

Check $EG = EG$ $\angle DEG \cong \angle FEG$

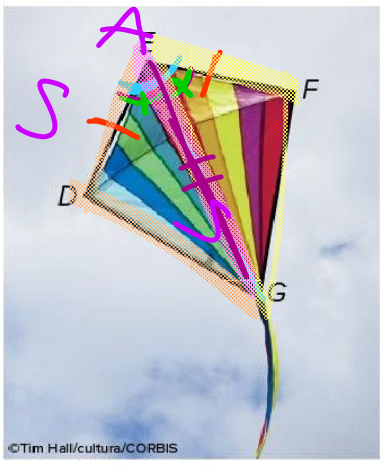
KITES The kite shown appears to be made up of congruent triangles. If $\overline{DE} \cong \overline{FE}$ and $\overline{EG}$ bisects $\angle DEF$, prove that $\triangle DEG \cong \triangle FEG$.

Complete the two-column proof.

60° 30° 30°

Given: $\overline{DE} \cong \overline{FE}$, $\overline{EG}$ bisects $\angle DEF$.

Prove: $\triangle DEG \cong \triangle FEG$



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Example 3

Use SAS to Prove Triangles Congruent

Proof:

Statements	Reasons
1. $DE = FE$	1. Given
2. $\overline{EG}$ bisects $\angle DEF$.	2. Given
3. $\angle DEG = \angle FEG$	3. Definition of angle bisector
4. $EG = EG$	4. Reflexive
5. $\triangle DEG \cong \triangle FEG$	5. SAS

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