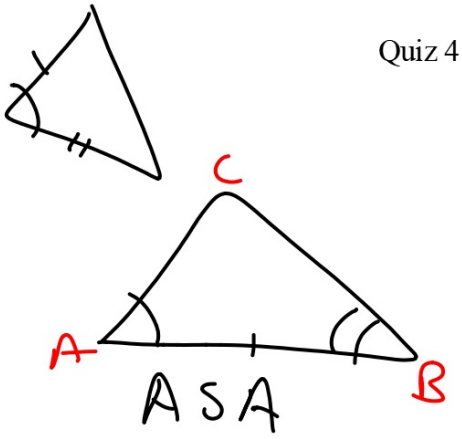
SSS SAS

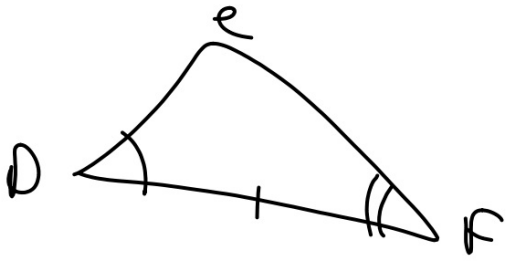
Geometry 4.5
Use the ASA postulate to test congruence
Use the AAS postulate to test congruence

included angle
included side

activity: exploragons
construction ASA p. 275

Quiz 4.3-4.4

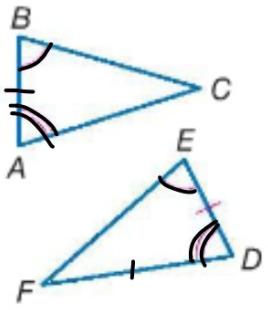




Postulate 4.3 Angle-Side-Angle (ASA) Congruence

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.

Example If **A**ngle $\angle A \cong \angle D$,
Side $\overline{AB} \cong \overline{DE}$, and
Angle $\angle B \cong \angle E$,
then $\triangle ABC \cong \triangle DEF$.



ASA (in that order)

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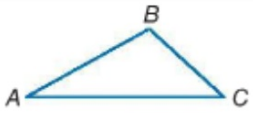
Construction Congruent Triangles Using Two Angles and Included Side

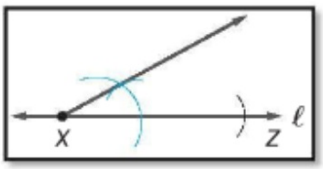
Draw a triangle and label it $\triangle ABC$. Then use the ASA Postulate to construct $\triangle XYZ \cong \triangle ABC$.



Step 1

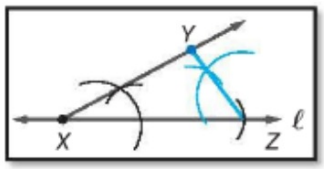
Draw a line ℓ and select a point X. Construct $\overline{XZ}$ such that $\overline{XZ} \cong \overline{AC}$.

Step 2



Construct an angle congruent to $\angle A$ at X using $\overleftrightarrow{XZ}$ as a side of the angle.

Step 3



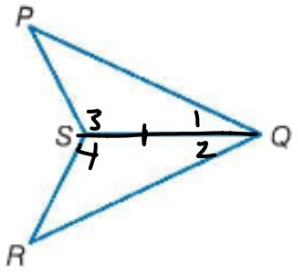
Construct an angle congruent to $\angle C$ at Z using $\overleftrightarrow{XZ}$ as a side of the angle. Label the point where the new sides of the angles meet as Y.

Example 1 Use ASA to Prove Triangles Congruent

Write a two-column proof.

Given: $\overline{QS}$ bisects $\angle PQR$; $\angle PSQ \cong \angle RSQ$.

Prove: $\triangle PQS \cong \triangle RQS$



Proof:

1. $\overline{QS}$ bis. $\angle PQR$, $\angle 3 \cong \angle 4$	1. given
2. $\angle 1 \cong \angle 2$	2. def bis.
3. $\overline{QS} \cong \overline{QS}$	3. refl
4. $\triangle PQS \cong \triangle RQS$	4. ASA

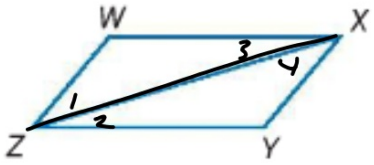
SSS SAS ASA

GuidedPractice

1. Write a flow proof.

Given: $\overline{ZX}$ bisects $\angle WZY$; $\overline{XZ}$ bisects $\angle YXW$.

Prove: $\triangle WXZ \cong \triangle XZY$



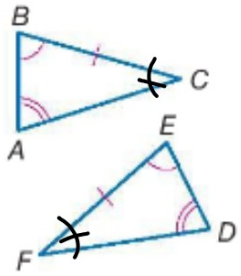
If we know 2 angles, don't we also know the third angle?
(Third angle theorem)
So isn't this just a special case of ASA?

A A

Theorem 4.5 Angle-Angle-Side (AAS) Congruence

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

Example If Angle $\angle A \cong \angle D$,
Angle $\angle B \cong \angle E$, and
Side $\overline{BC} \cong \overline{EF}$,
then $\triangle ABC \cong \triangle DEF$.



MUST be the corresponding side!

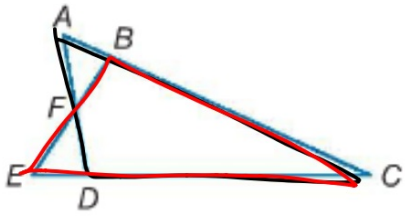
Hard to see when triangles overlap...
re-draw non-overlapping

Example 2 Use AAS to Prove Triangles Congruent

Write a two-column proof.

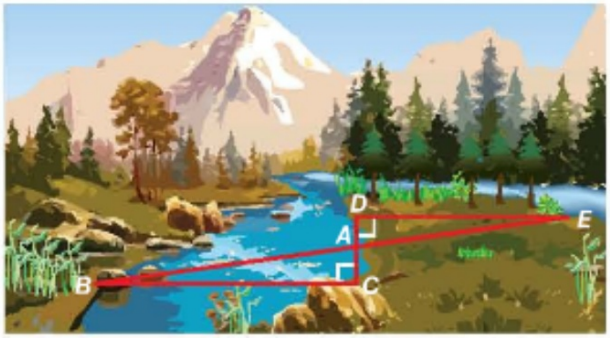
Given: $\angle DAC \cong \angle BEC$
$\overline{DC} \cong \overline{BC}$

Prove: $\triangle ACD \cong \triangle ECB$



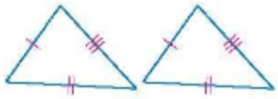
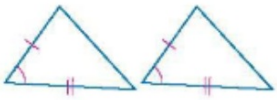
Real-World Example 3 Apply Triangle Congruence

COMMUNITY SERVICE Jeremias is working with a community service group to build a bridge across a creek at a local park. The bridge will span the creek between points C and B. Jeremias located a fixed point D to use as a reference point so that the segments have the relationships shown. A is the midpoint of $\overline{CD}$ and DE is 15 feet. How long does the bridge need to be?



Start a new (separate) page: Triangle congruence page
Will record all triangle congruence postulates/theorems here. (Will be a dozen or so)

ConceptSummary Proving Triangles Congruent

SSS	SAS	ASA	AAS
			
Three pairs of corresponding sides are congruent.	Two pairs of corresponding sides and their included angles are congruent.	Two pairs of corresponding angles and their included sides are congruent.	Two pairs of corresponding angles and the corresponding nonincluded sides are congruent.