Mathematics Class Slides

Bronx Early College Academy

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26 November 2018

4.1 Project: Triangle congruence project, Monday 26 November

SSS Triangle congruence. Monday 26 November

SAS Triangle congruence. Tuesday 27 November

ASA Triangle congruence. Wednesday 28 November

SSA Triangle congruence. Thursday 29 November

HL Triangle congruence. Tuesday 4 December

Construction project: Triangle congruence

CCSS: HSG.CO.C.9 Prove geometric theorems 4.1

Four pages of $\triangle$ duplication for your binder

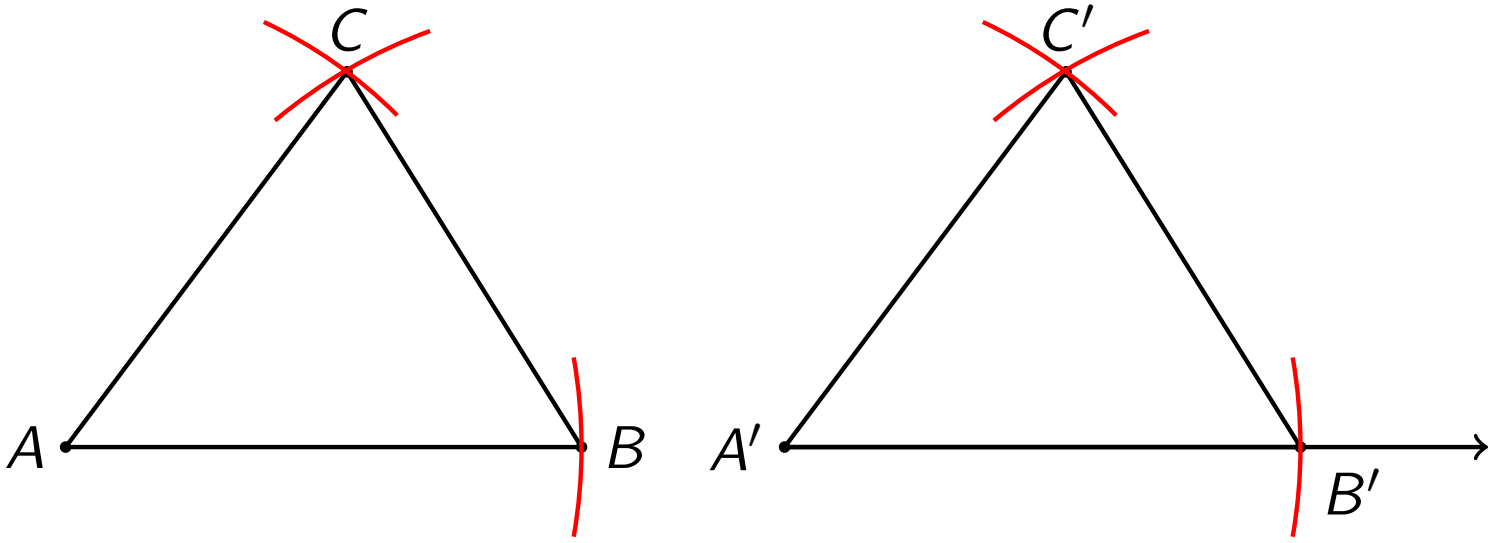
1. Side-side-side (SSS $\triangle \cong$)
   $\triangle ABC \cong \triangle A'B'C'$ iff
   $\overline{AB} \cong \overline{A'B'}, \overline{BC} \cong \overline{B'C'},$ and $\overline{AC} \cong \overline{A'C'}$
2. Side-angle-side (SAS)
3. Angle-side-angle (ASA)
4. Side-side-angle (SSA), false, "ambiguous case"

Function notation: $A \to A'$ is pronounced "A gets mapped to A prime," or "A corresponds to A prime."

SSS Triangle congruence ("side-side-side")

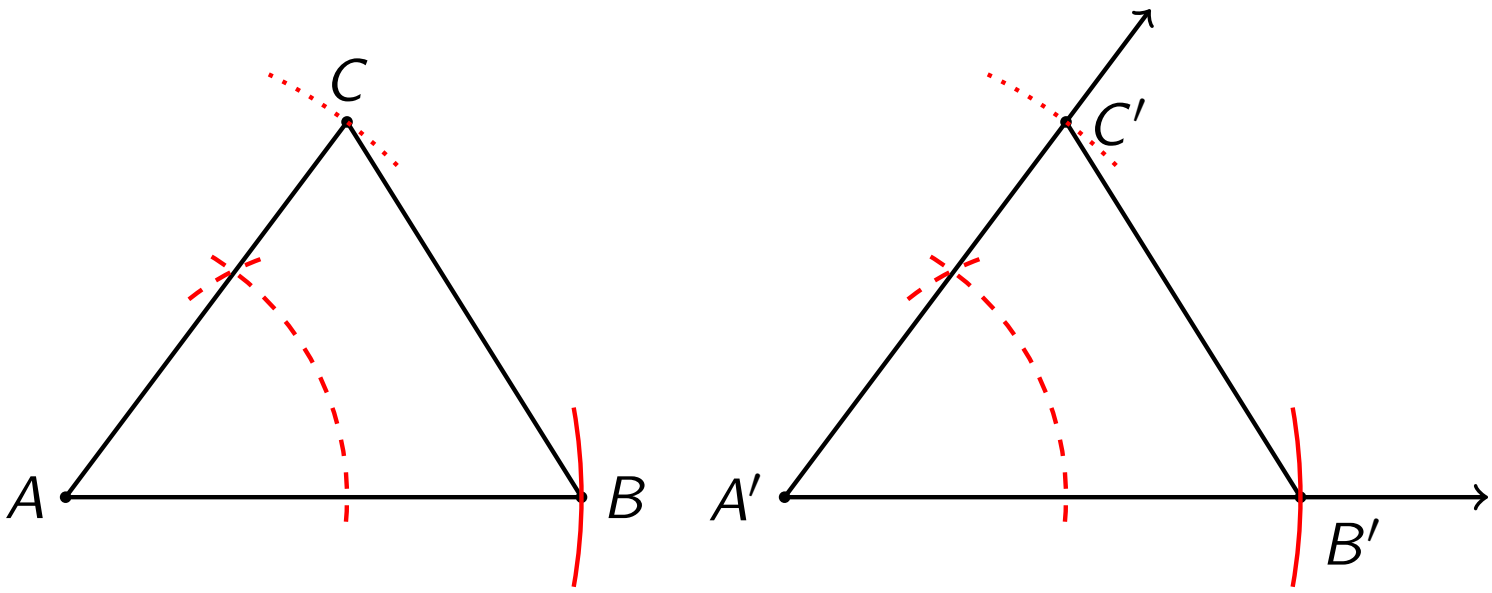
Given $\triangle ABC$, duplicate $\triangle ABC$ by duplicating each side.

1. Construct $\overrightarrow{A'}$.
2. Circle A' with radius AB. Intersection B'.
3. Circle A' with radius AC.
4. Circle B' with radius BC. Intersection C'.
5. $\triangle ABC \cong \triangle A'B'C'$ by the SSS $\triangle \cong$ Postulate.



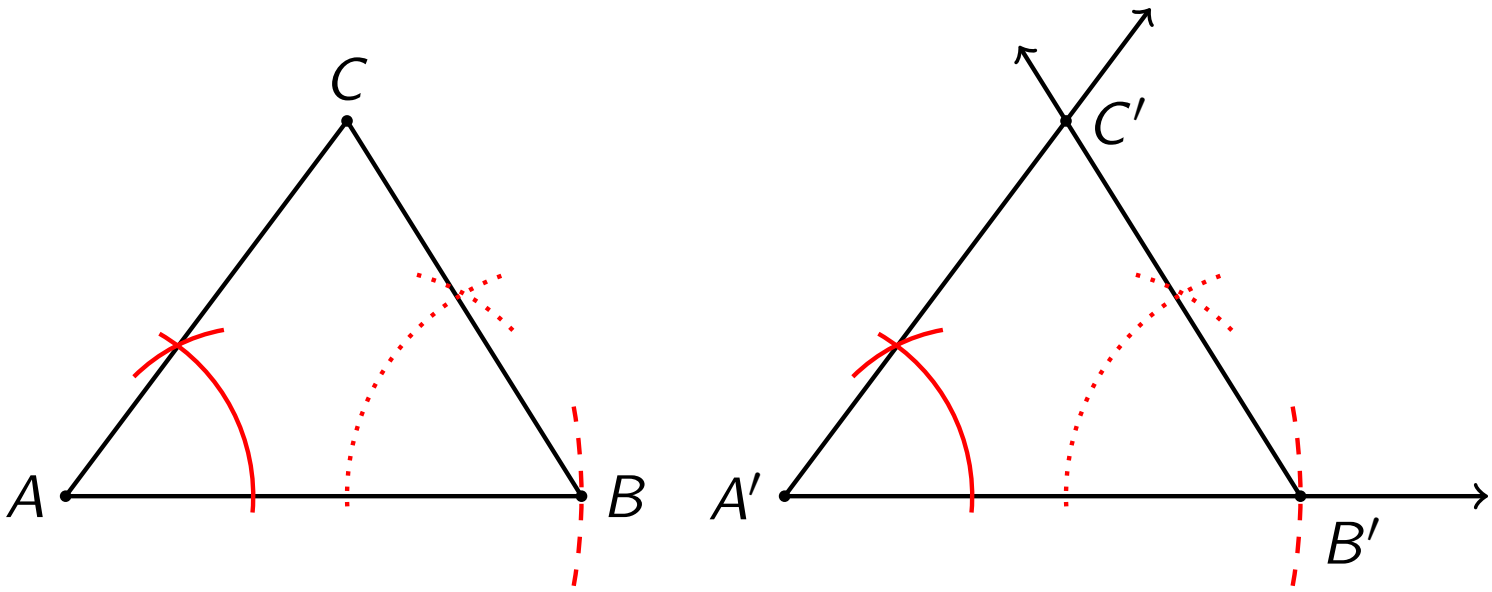
SAS Triangle congruence ("side-angle-side")

1. Given $\triangle ABC$, construct a duplicate $\triangle A'B'C'$
2. Duplicate side $\overline{AB}$, duplicate $\angle A$, duplicate side $\overline{AC}$
3. Angle must be the *included* angle, between the two sides
4. $\triangle ABC \cong \triangle A'B'C'$ iff $\overline{AB} \cong \overline{A'B'}, \angle A \cong \angle A',$ & $\overline{AC} \cong \overline{A'C'}$



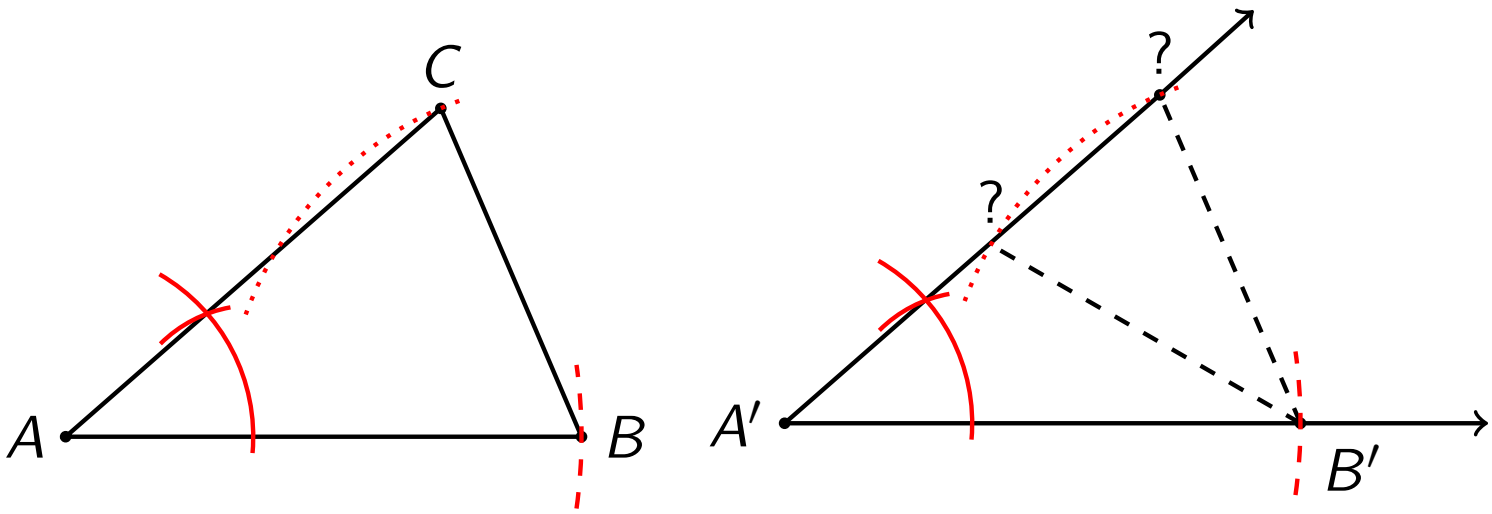
ASA Triangle congruence ("angle-side-angle")

1. Given $\triangle ABC$, construct a duplicate $\triangle A'B'C'$
2. Duplicate $\angle A$, duplicate side $\overline{AB}$, duplicate $\angle B$
3. One side and *any* two angles ("AAS" is ok)
4. $\triangle ABC \cong \triangle A'B'C'$ iff $\angle A \cong \angle A', \overline{AB} \cong \overline{A'B'}$, & $\angle B \cong \angle B'$



SSA *false* congruence (ASS or "jack ass theorem")

1. Given $\triangle ABC$, two $\triangle$s may have two pairs of congruent sides and a *non-included* congruent angle.
2. This is called the "ambiguous case"



HL Triangle congruence ("hypotenuse-leg")

Given right $\triangle ABC$, duplicate $\triangle ABC$ by duplicating a leg, the right angle, and the hypotenuse.

1. Construct $\overrightarrow{A'}$.
2. Circle A' with radius AB. Intersection B'.
3. Construct a perpendicular to $\overline{A'B'}$ through B'.
4. Circle A' with radius AC. Intersection C'.
5. $\triangle ABC \cong \triangle A'B'C'$ by the HL $\triangle \cong$ theorem.