

Analytic Geometry

February 4, 2016

Triangle Congruency: SSS, SAS, ASA, & AAS

EQ: What does it mean if two triangles are
congruent?

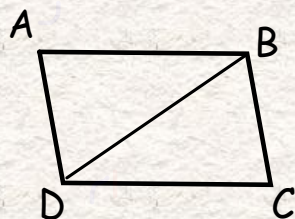
MCC9-12.G.CO.7 Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.

Oct 25-3:29 AM

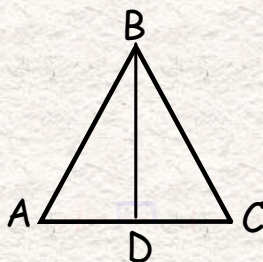
Warm-up: Practice marking diagrams

1. $\angle BAC \cong \angle DCA$

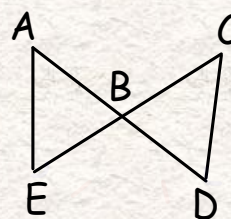
$\overline{BA} \cong \overline{DC}$



2. $\overline{BD} \perp \overline{AC}$

D is the midpoint of \overline{AC} 

3. $\angle A \cong \angle C; \overline{AB} \cong \overline{CB}$



Dec 7-3:25 PM

Homework Answers

1. a) \overline{NY}
b) $\angle X$
2. a) \overline{RO}
b) $\angle T$
3. a) $\angle A$
b) \overline{KL}
c) \overline{CKLU}
4. a) $\angle M$ $\angle T$
b) 92°
5. C
6. Yes, $\angle C$ $\angle A$ by the third angle theorem and \overline{BD} \overline{BD} by the reflexive property.
7. $x = 10$; $\angle A = \angle D = 20^\circ$
8. $y = 4$; $\angle B = \angle E = 12^\circ$
9. $z = 2$; $\overline{BC} = \overline{EF} = 8$
10. $a = 2$; $\overline{AC} = \overline{DF} = 19$

Mar 1-8:26 AM

Key Concepts:

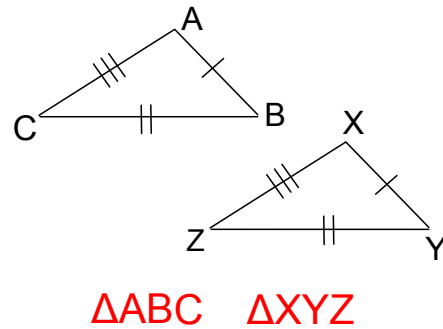
There is a set of congruence criteria that lets us determine whether triangles are congruent with less information. The criteria for triangle congruence, known as Triangle Congruence Statement, provide the least amount of information needed to determine if two triangles are congruent.

Each congruence statement refers to the corresponding parts of the triangles. By looking at the information about each triangle, you can determine whether the triangles are congruent.

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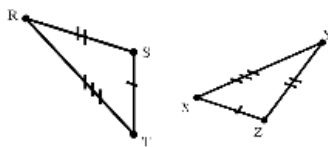
The Side-Side-Side Congruence Statement

states that if three sides of one triangle are congruent to three sides of another triangle, then the two triangles are congruent.

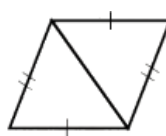


Could you prove the following triangles are congruent by SSS?

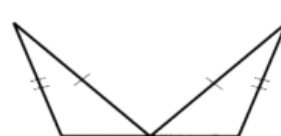
1. YES



2. YES

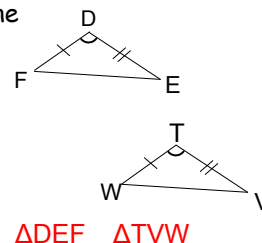


3. NO



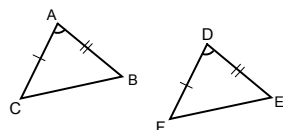
Sep 17-4:52 PM

The Side-Angle-Side Congruence Statement states that if two sides and the included angle of one triangle are congruent to two sides and the included angle of another triangle, then the two triangles are congruent.



The included angle is the angle that is between the two congruent sides.

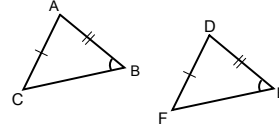
Included Angle



∠A is included between CA and AB.

∠D is included between FD and DE.

Non-Included Angle



∠B is NOT included between CA and AB.

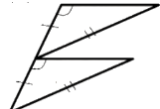
∠E is NOT included between FD and DE.

Could you prove the following triangles are congruent by SAS?

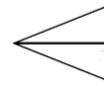
1. YES



2. NO

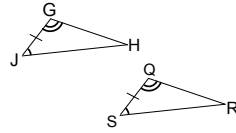


3. YES



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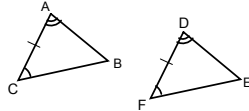
The Angle-Side-Angle Congruence Statement states that if two angles and the included side of one triangle are congruent to two angles and the included side of another triangle, then the two triangles are congruent.



$\Delta GHJ \cong \Delta QRS$

The included side is the side that is between the two congruent angles.

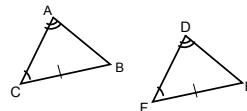
Included Side



AC is included between $\angle C$ and $\angle A$.

DF is included between $\angle F$ and $\angle D$.

Non-Included Side

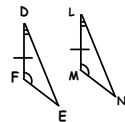


CB is NOT included between $\angle C$ and $\angle A$.

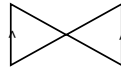
FE is NOT included between $\angle F$ and $\angle D$.

Could you prove the following triangles are congruent by ASA?

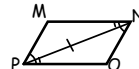
1. YES



2. NO



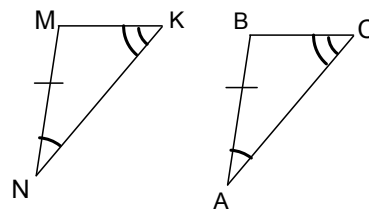
3. YES



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A fourth congruence statement, Angle-Angle-Side,

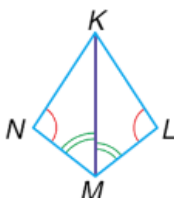
states that if two angles and a nonincluded side of one triangle are congruent to the corresponding two angles and side of a second triangle, then the triangles are congruent.



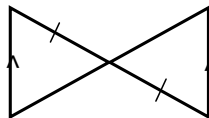
$\Delta NMK \cong \Delta ABC$

Could you prove the following triangles are congruent by AAS?

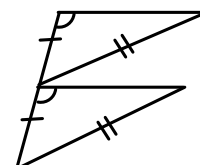
1. YES



2. YES



3. NO

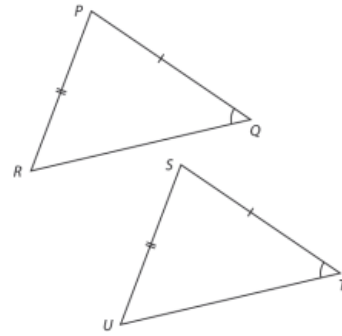


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Determine which congruence statement, if any, can be used to show that $\triangle PQR$ and $\triangle STU$ are congruent if $\overline{PQ} \cong \overline{ST}$, $\overline{PR} \cong \overline{SU}$, and $\angle Q \cong \angle T$.

SSS
SAS
ASA
AAS

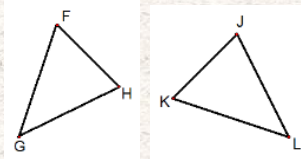
**Your Only Ways To
Prove Triangles Are
Congruent**



Feb 28-12:44 PM

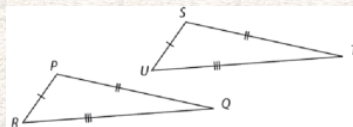
Example 1:

Suppose it is given that $\overline{FG} \cong \overline{KL}$, $\overline{GH} \cong \overline{JL}$, and $\overline{FH} \cong \overline{JK}$. Can it be shown that $\triangle FGH \cong \triangle KLJ$? If so, how can this be determined?



Example 2:

Is it possible to show that $\triangle PQR$ and $\triangle STU$ are congruent, if so, how?



Example 3:

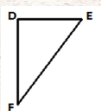
Suppose it is given that $\overline{PQ} \cong \overline{ST}$, $\overline{PR} \cong \overline{SU}$, and $\angle Q \cong \angle T$. Can it be shown that $\triangle PQR \cong \triangle STU$?

Dec 7-3:23 PM

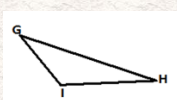
Example 4:

In each triangle, find the included angle between the two given sides

a) Sides EF and DF



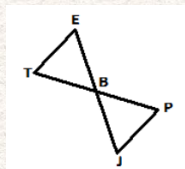
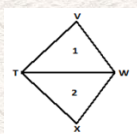
b) Sides GH and IH



c) Sides JK and KL

**Example 5:**

In the figure to the right, suppose point B is the midpoint of TP and EJ, is there enough information to prove that $\triangle EBT$ is congruent to $\triangle BJP$?

**Example 6:**

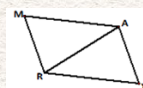
Consider the given figure. Suppose it is known that TV is congruent to TX, and WT bisects $\angle VTW$.

Is there enough information to prove that Triangles 1 and 2 are congruent?

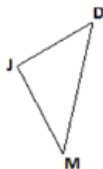
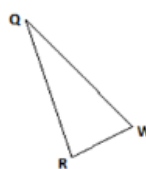
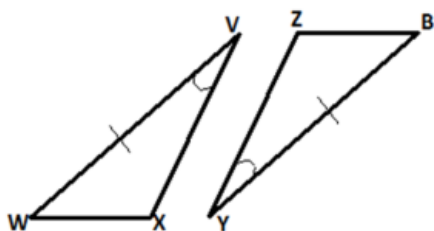
Example 7:

In the figure, MA is parallel and congruent to RX.

Is there enough information to prove that $\triangle MAR$ is congruent to $\triangle XRA$?



Dec 7-3:23 PM

Example 8: In each triangle, state the included side between the given two angles.a) $\angle D$ and $\angle J$ b) $\angle Q$ and $\angle W$ **Example 9:**

Consider the figure. Write a congruency statement in order to answer the questions below.

a) What else must be true in order to prove that the triangles are congruent by ASA?

b) What else must be true in order to prove that the triangles are congruent by AAS?

Feb 28-12:10 PM

Homework: worksheet

On-line and textbook help references: p. 148 - 153; 193

- <http://www.regentsprep.org/Regents/math/geometry/GP4/Ltriangles.htm>

- https://www.khanacademy.org/math/geometry/congruent-triangles/cong_triangle/v/congruent-triangles-and-sss-

- <http://www.mathsisfun.com/geometry/triangles-congruent-finding.html>

Dec 7-3:33 PM