Noted 3

Triangle Congruence Theorems

You look like twins... Are you? Let's have a little look at that there DNA shall we?

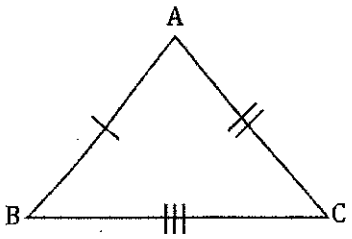
Remember back when we talked about what congruent meant? No? Okay, remember it means two shapes that are exactly the same size and shape...like identical twins. Okay, so two people run into each other walking down the sidewalk, they look exactly alike. Are they long lost identical twins, or just a freak coincidence of genetic mayhem? Well, there's a good way to find out... You guessed it! A DNA test will confirm if these two are twins or just scary.

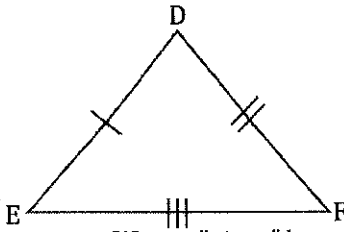
The triangle congruence theorems are no different than a DNA test... Okay, well there is less blood and bodily fluids involved... but other than that they perform the same function... confirming identical triangle twins.

They are SSS, SAS, ASA, AAS, and HL (for right triangles only).

Huh? Okay, we will look at an example of each before we get into practicing.

SSS stands for Side, Side, Side. If three sides of one triangle are congruent to three sides of the other triangle then the triangles are congruent. Take a look...



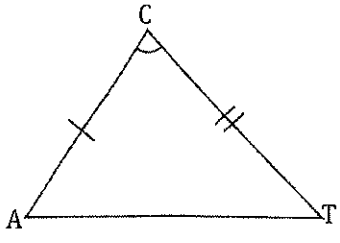


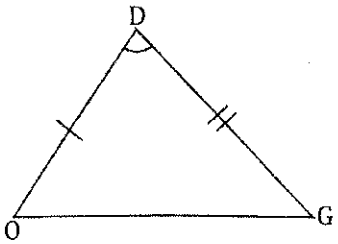
$\overline{AB} \cong \overline{DE}$ given
$\overline{AC} \cong \overline{DF}$ given
$\overline{BC} \cong \overline{EF}$ given

So $\triangle ABC \cong \triangle DEF$ by SSS.

We say "given" because they have been marked on the diagram like that info was "given" to us.

SAS stands for Side, Angle, Side. If two sides of a triangle and the included angle (means the one between the two sides) are congruent to the two sides, and an included angle of another triangle are congruent, then the triangles themselves are congruent. Take another look...

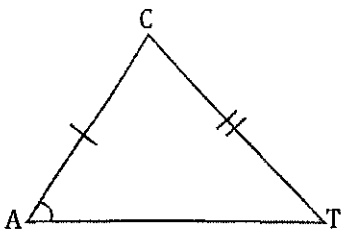


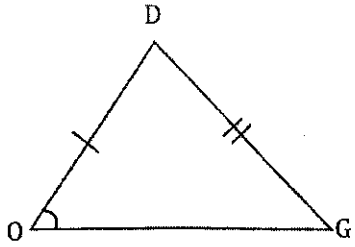


$\overline{AC} \cong \overline{OD}$ given
$\angle C \cong \angle D$ given
$\overline{CT} \cong \overline{DG}$ given

So $\triangle ABC \cong \triangle DEF$ by SAS.

WATCH OUT! If the angles that are congruent are not between the two sides like this...

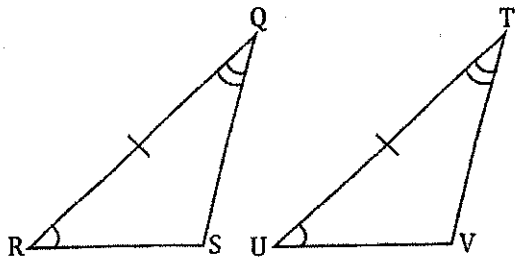




then it's not SAS, it's ASS. Don't say ASS! Don't use ASS! It is not a congruence property! Don't use SSA either, because it is just ASS backwards.

Ahem....now that we have that cleared up...

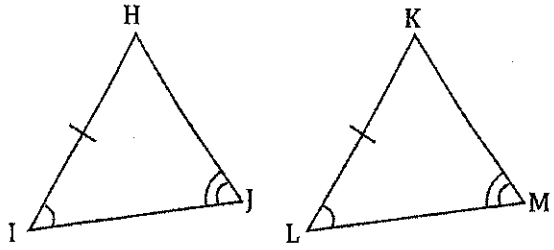
ASA stands for Angle, Side, Angle. If two angles of a triangle and the included side (means the one between the two angles) are congruent to the two angles and an included side of another triangle, then the triangles themselves are congruent. More looking for you...



$\angle R \cong \angle U$ given
$\overline{RQ} \cong \overline{UT}$ given
$\angle Q \cong \angle T$ given

So $\triangle QRS \cong \triangle TUV$ by ASA.

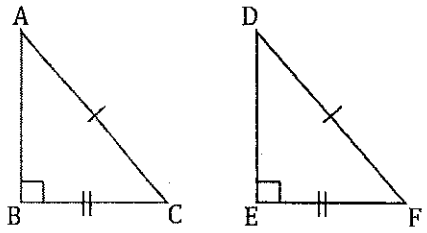
AAS stands for Angle, Angle, Side. It is really just a form of ASA. Think about it, If you have two angles in a triangle you can always find the third using the Triangle Sum Theorem. If you have AAS, you can find the third A, and get to ASA. Fortunately, we don't have to actually do this because it can be as hard as it sounds. Here is an example of AAS.



$\angle I \cong \angle L$ given
$\angle J \cong \angle M$ given
$\overline{IH} \cong \overline{LK}$ given

So $\triangle HIJ \cong \triangle KLM$ by AAS.

HL stands for Hypotenuse, Leg. What kind of triangle has a hypotenuse? A right triangle of course. This special congruence property is for right triangles only. If the hypotenuse and one leg of a right triangle is congruent to the hypotenuse and leg of another, then the right triangles are congruent. This is actually a shortcut for SSS because if you have two sides of a right triangle you can find the third using the Pythagorean theorem, thus arriving at SSS. Fortunately, you don't have to do that either.



$\overline{AC} \cong \overline{DF}$ given
$\overline{BC} \cong \overline{EF}$ given

So $\triangle ABC \cong \triangle DEF$ by HL.

Make sure when you do this one that you actually have a hypotenuse and a leg and not two legs. (If you do have two legs the right angle will be between them giving you SAS. Trust me, you'll see.)

Great, these really don't get too hard except sometimes you have to come up with some parts that are congruent, like alternate interior angles, or shared sides. We will start with some simple examples. When we get to the little bit harder ones, I'll walk you through how to find the missing pieces.

To the twin mobile!...Okay, bad example.

Notes 3

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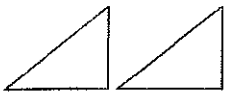
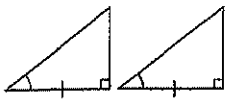
Congruent Triangles

EXAMPLE

Are these 2 triangles congruent?
Measure the sides and angles of both triangles.

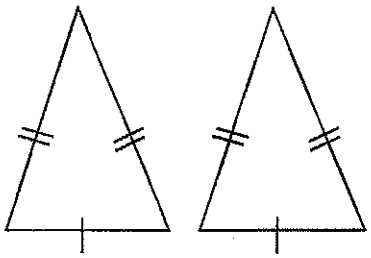


Label the sides and angles that match. Because the triangles have 2 angles and an included side that are equal, they are congruent. (ASA)



Directions Are the triangles in each pair congruent? Tell why or why not.

1.



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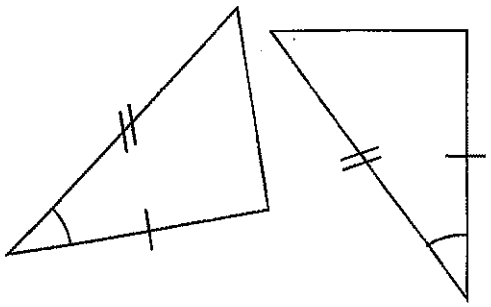

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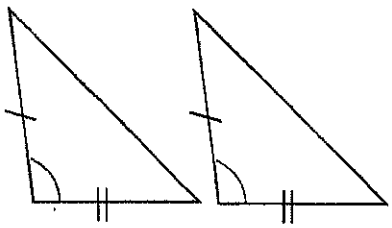

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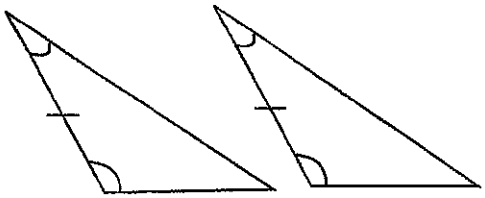

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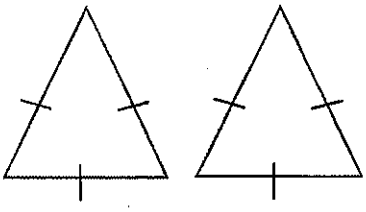

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