

Classification by Angles

Acute Triangle

Equiangular Triangle

Right Triangle

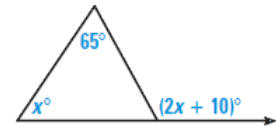
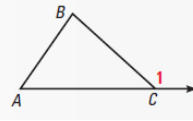
Obtuse Triangle



The sum of the three angles for any triangle = 180°

Exterior Angles Theorem:

The measure of an exterior angle of a triangle is equal to the sum of the two nonadjacent interior angles.

Example: Find the value of x 

$$x + 65 = 2x + 10$$

$$65 - 10 = 2x - x$$

$$\boxed{55 = x}$$

Nov 27-8:08 AM

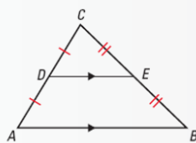
Theorem 5.9

THEOREM

THEOREM 5.9 Midsegment Theorem

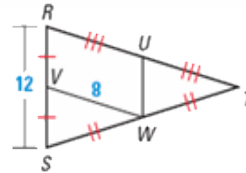
The segment connecting the midpoints of two sides of a triangle is parallel to the third side and is half as long.

$$\overline{DE} \parallel \overline{AB} \text{ and } DE = \frac{1}{2}AB$$



EXAMPLE:

\overline{UW} and \overline{VW} are midsegments of $\triangle RST$. Find UW and RT .



Solution

$$UW = \frac{1}{2}RS$$

$$UW = \frac{1}{2}(12) = 6$$

$$VW = \frac{1}{2}RT$$

$$2VW = RT$$

$$2(8) = RT$$

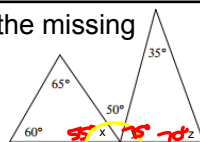
$$\boxed{RT = 16}$$

Warm Up:

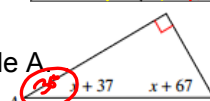
1. $m\angle H = 5x - 7$
 $m\angle F = 14x + 1$
 $m\angle H = 5(9) - 7 = 38^\circ$

$$\begin{aligned} 89 + 5x - 7 &= 14x + 1 \\ 82 + 5x &= 14x + 1 \\ -5x & -5x \\ 82 &= 9x + 1 \\ 81 &= 9x \\ 9 &= x \end{aligned}$$

2. Find the missing angles.

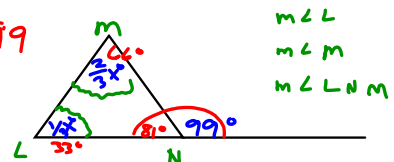


3. Find angle A



$$\begin{aligned} (x + 37) + (x + 67) + 90 &= 180 \\ x + 37 + x + 67 &= 90 \\ 2x + 104 &= 90 \\ -104 & -104 \\ 2x &= -14 \\ x &= -7 \end{aligned}$$

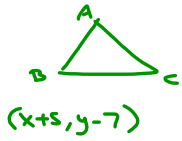
$$\begin{aligned} \frac{1}{2}x + \frac{2}{3}x &= 99 \\ x &= 99 \end{aligned}$$



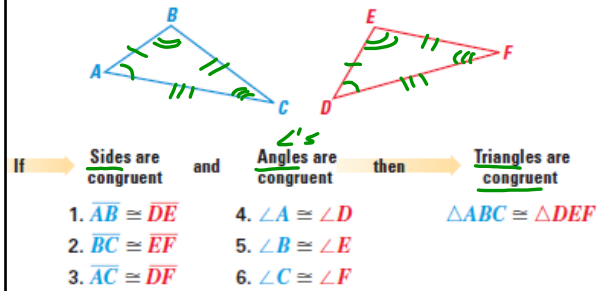
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Proving Triangles are Congruent



WE KNOW.....



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Sep 22-10:38 AM

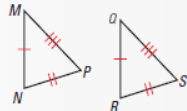
In this section we introduce 2 postulates.
The first is:

POSTULATE

POSTULATE 19 Side-Side-Side (SSS) Congruence Postulate

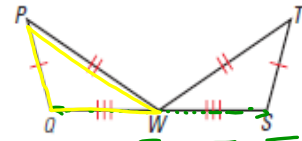
If three sides of one triangle are congruent to three sides of a second triangle, then the two triangles are congruent.

If Side $\overline{MN} \cong \overline{QR}$,
Side $\overline{NP} \cong \overline{RS}$, and
Side $\overline{PM} \cong \overline{SQ}$,
then $\triangle MNP \cong \triangle QRS$.



In a nutshell this says, if you know each of the three sides are congruent, then the overall triangles are congruent.

Example: Are the two triangles in the diagram congruent? If so, by what postulate? Write a congruence statement.



Answer: $\overline{QP} \cong \overline{ST}$, $\overline{PW} \cong \overline{TW}$, $\overline{QW} \cong \overline{WS}$
Yes, by SSS $\triangle QPW \cong \triangle STW$

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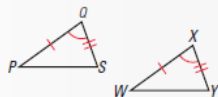
The second postulate we will talk about is:

POSTULATE

POSTULATE 20 Side-Angle-Side (SAS) Congruence Postulate

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 two triangles are congruent.

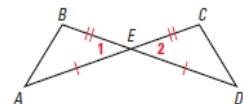
If Side $\overline{PQ} \cong \overline{WX}$,
Angle $\angle Q \cong \angle X$, and
Side $\overline{QS} \cong \overline{XY}$,
then $\triangle PQS \cong \triangle WXY$.



Which says, if two sides and their INCLUDED angle are congruent, then the two triangles are congruent.

Example: Prove the two triangles are congruent

Prove that $\triangle AEB \cong \triangle DEC$.



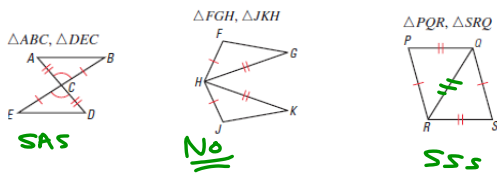
Statement	Reason
$\overline{AE} \cong \overline{DE}$	Given
$\angle 1 \cong \angle 2$	vertical \angle 's are \cong
$\overline{BE} \cong \overline{CE}$	Given
$\triangle ABE \cong \triangle DCE$	SAS

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MORE EXAMPLES:

Is there enough information given to show that the two triangles are congruent?
If so, state which congruence postulate you used.

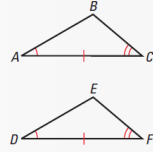


The third postulate is ASA:

POSTULATE 21 **Angle-Side-Angle (ASA) Congruence Postulate**

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

If Angle $\angle A \cong \angle D$,
Side $\overline{AC} \cong \overline{DF}$, and
Angle $\angle C \cong \angle F$,
then $\triangle ABC \cong \triangle DEF$.



The important thing here, is that the SIDE is BETWEEN the two angles.

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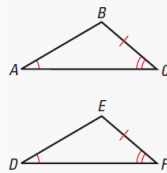
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The fourth postulate is AAS:

THEOREM 4.5 **Angle-Angle-Side (AAS) Congruence Theorem**

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

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



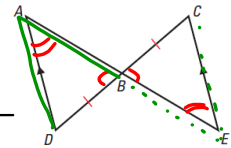
With this postulate, there are two angles and then a congruent side.

Proving Triangles are Congruent:

GIVEN $\overline{AD} \parallel \overline{EC}$, $\overline{BD} \cong \overline{BC}$

PROVE $\triangle ABD \cong \triangle ECB$

Statement	Reason
$\overline{DB} \cong \overline{CB}$	Given
$\angle ABD \cong \angle ECB$	Vert. \angle 's are \cong
$\overline{AD} \parallel \overline{EC}$	Given
$\angle DAB \cong \angle ECB$	Alt. int. \angle 's are \cong
$\triangle ABD \cong \triangle ECB$	AAS

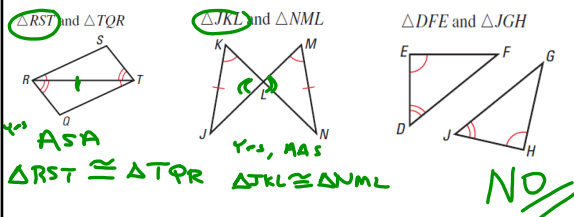


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Examples:

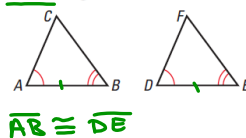
Is it possible to prove the triangles are congruent? If so, state the congruence postulate that you'd use and write the congruence statement.



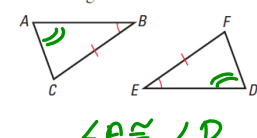
More Examples:

State the third congruence that must be given in order to prove the triangles are congruent by the given postulate.

ASA Congruence Postulate



AAS Congruence Theorem



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