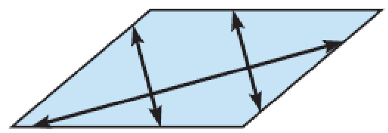
Geometry Unit 4 Vocabulary

Triangle Congruence

<u>Biconditional statement</u> – A is a statement that contains the phrase "if and only if." Writing a biconditional statement is equivalent to writing a conditional statement and its converse.

The biconditional statement below can be rewritten as a conditional statement and its converse.

Three lines are coplanar if and only if they lie in the same plane.



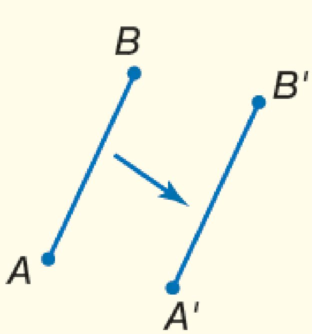
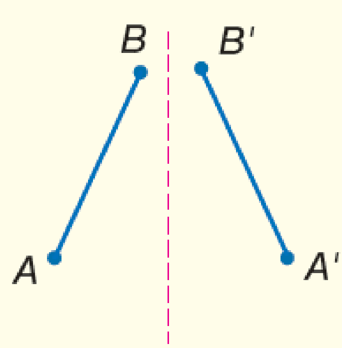
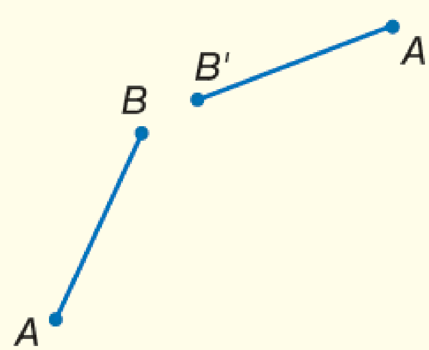
Conditional statement: If three lines are coplanar, then they lie in the same plane.

Converse: If three lines lie in the same plane, then they are coplanar.

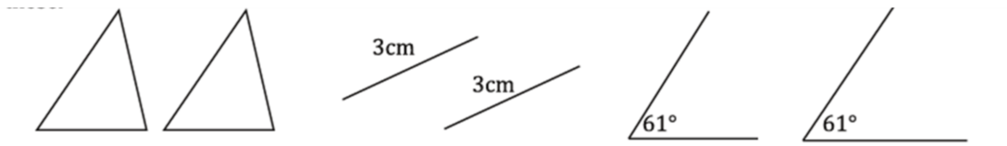
. . . .

A biconditional statement can be either true or false. To be true, *both* the conditional statement and its converse must be true. This means that a true biconditional statement is true both "forward" and "backward." All definitions can be written as true biconditional statements.

<u>Congruence Transformations</u>–transformations that preserve distance, therefore, creating congruent figures

Translation	Reflection	Rotation
• length is the same • orientation is the same	• length is the same • orientation is reversed	• length is the same • orientation is changed
Notice the segments are facing the same way.	Notice the segments are facing the opposite way.	Notice the segments are facing a different way.
		

Congruence $(\cong)$ – the same shape and the same size



(Yes... these are the same size and shape.
Remember the segments aren't the angles.)

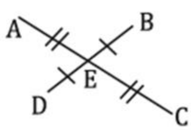
If you want to say two segments are congruent. Do it like this...

$\overline{AB} \cong \overline{CD}$ The symbol "≅" means "congruent" or "is congruent to..." So this reads "segment AB is congruent to segment CD."

If you want to say two angles are congruent. Do it like this...

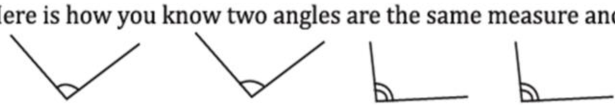
$\angle A \cong \angle C$ Again, the symbol "≅" means "congruent" or "is congruent to..." So this reads, "angle B is congruent to angle C."

Here is how you know two segments are the same length and congruent in a diagram...



Every segment that has a "⟍" on it is congruent to every other segment that has a "⟍" (called a slash or a hash mark). So, $\overline{BE} \cong \overline{DE}$ (BE=DE too). Every segment that has two of them is congruent to every other with two. So, $\overline{AE} \cong \overline{CE}$ (AE=CE too), but $\overline{BE}$ is not ≅ to $\overline{AE}$ and so on....

Here is how you know two angles are the same measure and congruent in a diagram.

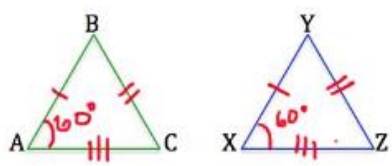


Any angle with one arc is congruent to all the others with one arc. Any angle with two arcs is congruent to any angle with two arcs.

Let's practice...

Corresponding Parts of Congruent Triangles are Congruent **CPCTC**

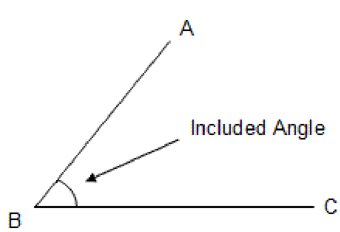
Corresponding Parts of Congruent Triangles are Congruent

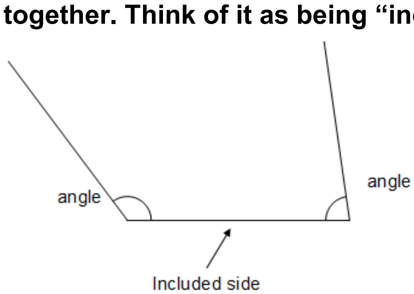


$\Delta ABC \cong \Delta XYZ$

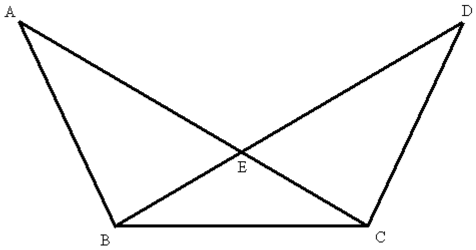
Included angle – **the angle made by two lines with a common vertex. (When two lines meet at a common point (vertex) the angle between them is called the included angle. The two lines define the angle.)**

Included side – **the common side of two legs. (Usually found in triangles and other polygons, the included side is the one that links two angles together. Think of it as being "included" between 2 angles.**



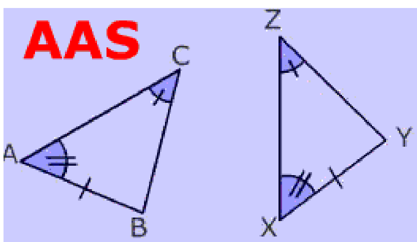


<u>Overlapping triangles</u> – triangles lying on top of one another sharing some but not all sides.

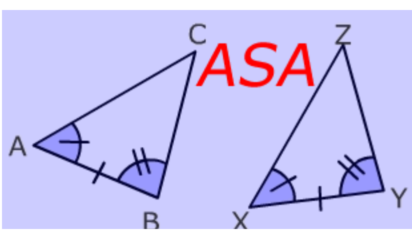


<u>Theorems</u>

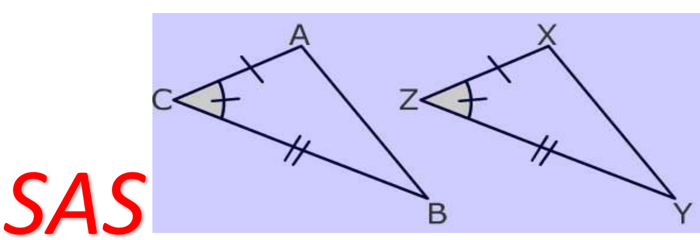
<u>AAS Congruence Theorem</u> – Triangles are congruent if two pairs of corresponding angles and a pair of opposite sides are equal in both triangles.



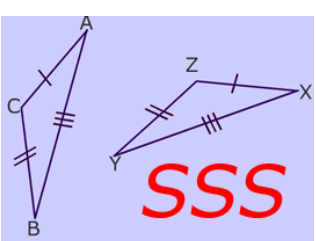
<u>ASA Congruence Theorem</u> -Triangles are congruent if any two angles and their <u>included side</u> are equal in both triangles.



<u>SAS Congruence Theorem</u> -Triangles are congruent if any pair of corresponding sides and their <u>included</u> <u>angles</u> are equal in both triangles.



<u>SSS Congruence Theorem</u> -Triangles are congruent if all three sides in one triangle are congruent to the corresponding sides in the other.



Special congruence theorem for RIGHT TRIANGLES!

Hypotenuse-Leg Congruence Theorem: HL

Hypotenuse-Leg Congruence Theorem (HL)

- If the hypotenuse and a leg of a right triangle are congruent to the hypotenuse and the leg of a second right triangle, then the two triangles are congruent.
- If $\triangle ABC$ and $\triangle DEF$ are right triangles, and

$\overline{AC} \cong \overline{DF}$, and
$\overline{BC} \cong \overline{EF}$, then

$\triangle ABC \cong \triangle DEF$