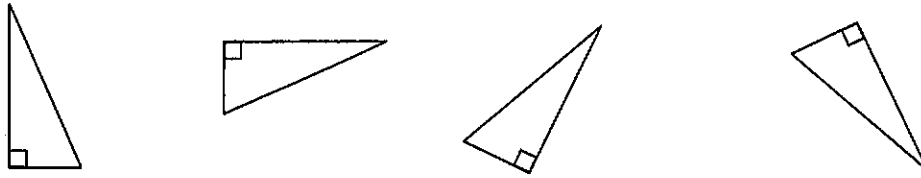




Congruence:

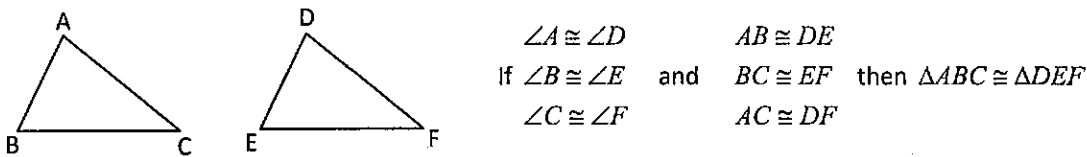
Congruent shapes have exactly the same size and shape. When two figures are congruent you can slide, flip, or turn one so that it fits exactly on the other one. For example, these triangles are all congruent:



Congruent polygons have congruent corresponding parts. This means that the matching sides and angles are the same. The matching angles and sides of congruent polygons are called **corresponding parts**.

Congruent Triangles:

Two triangles are congruent if they have three pairs of congruent corresponding angles and three pairs of congruent corresponding sides. For example,

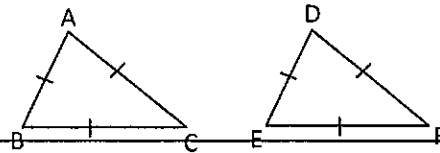


However, you don't need to know that all six conditions are true to ensure that the two triangles are congruent. In geometry, there are three postulates that we can use to prove that two triangles are congruent:

Side-Side-Side (SSS) Postulate, Side-Angle-Side (SAS) Postulate, and Angle-Side-Angle (ASA) Postulate.

The SSS Postulate:

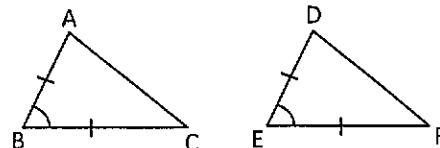
If three sides of one triangle are congruent to three sides of another triangle, then the two triangles are congruent.



Example 1:
 Given: $AB \cong CB$, $AD \cong CD$
 Prove: $\triangle ABD \cong \triangle CBD$
Solution:
 We can use the SSS postulate to prove that the triangles are congruent.
 We are given that the pairs of sides are congruent and
 We can see that the triangles share a common side, BD,
 so the third side of the triangles is also congruent.
 Since we know three sides of one triangle are congruent to three sides of the other triangle,
 we know that $\triangle ABD \cong \triangle CBD$

The SAS Postulate:

If two sides and the angle formed by these two sides of one triangle are congruent to two sides and the angle between the two sides of a second triangle, then the two triangles are congruent.

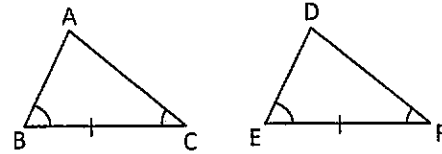


Example 2:
 Given: $RE \cong CA$, $RD \cong CT$ and $\angle R \cong \angle T$
 Is that enough information to prove that $\triangle RED \cong \triangle CAT$
Solution:
 Draw the two triangles.
 We see from the figure that angle T is not between two sides that we know to be congruent to corresponding sides in triangle CAT.
 Therefore, there is not information to prove $\triangle RED \cong \triangle CAT$



The ASA Postulate:

If two angles and the side included between them in a triangle are congruent to two angles and the included side of another triangle, then the two triangles are congruent.



Example 3: Given: $AB \cong AE$, $\angle CAB \cong \angle DAE$ and that $\angle ABC$ and $\angle AED$ are right angles

Prove that $\triangle ABC \cong \triangle AED$

Solution:

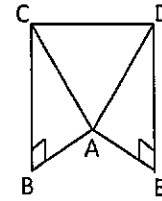
We can use the ASA Postulate.

We are given that $\angle ABC$ and $\angle AED$ are right angles, which means that these angles both measure 90° and are congruent.

We are also given that $AB \cong AE$, $\angle CAB \cong \angle DAE$.

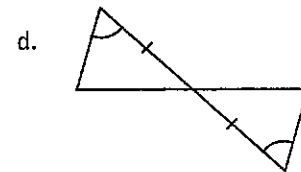
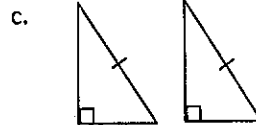
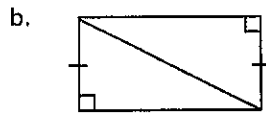
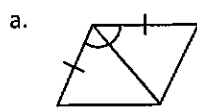
Thus, we know that two angles and the included side in $\triangle ABC$ are congruent to two angles and the included side in $\triangle AED$.

Therefore, $\triangle ABC \cong \triangle AED$



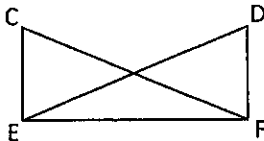
Practice Problems:

1. State the postulate you would use to prove the two triangles are congruent. If the triangles cannot be proven congruent, write not possible.



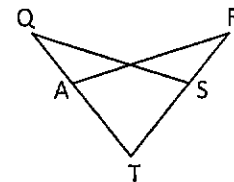
2. Given: $CE \cong DF$, $CF \cong DE$

Prove: $\triangle CEF \cong \triangle DFE$



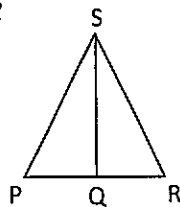
3. Given: $RT \cong QT$, $AT \cong ST$

Prove: $\triangle QST \cong \triangle RAT$



4. Given: $SQ \perp PR$, $SP \cong SR$

Prove: $\triangle SQP \cong \triangle SQR$



5. Given: AD bisects $\angle BAC$

$AB \cong AC$

