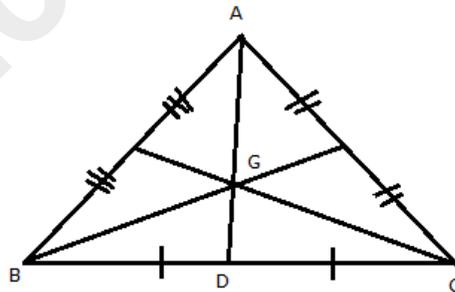# Congruent Triangles

Related Terms

1. A triangle is a simple closed figure made up of three line segments.

2. A triangle has six parts or elements, namely: a) Three sides and b) Three angles.

3. The point of intersection of two adjacent sides of a triangle is called a vertex. A triangle has 3 vertices.

4. A median of a triangle is the line segment joining a vertex of the triangle to the mid-point of its opposite side. A triangle has three medians.
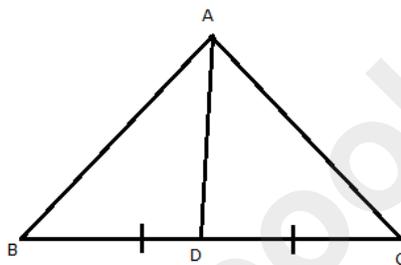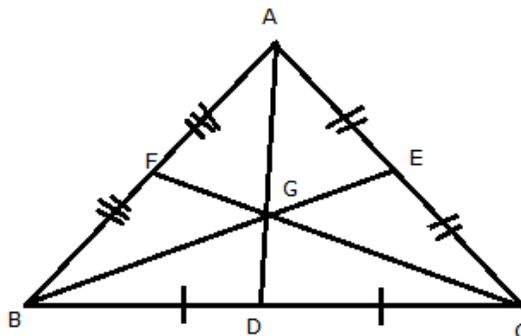

Here AD is the median corresponding to the side BC.

5. A triangle has three medians and all the three medians are always concurrent.

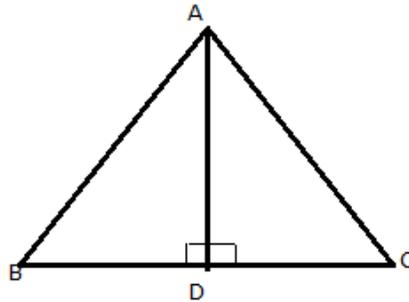6. The point of intersection of the medians is called the centroid of the triangle.

Here, G is the centriod of the triangle ABC.

7. Centroid of a triangle divides each median in the ratio 2 : 1.

From the figure, AG : GD = 2 : 1; BG : GE = 2 : 1; and CG : GF = 2 : 1

8. An altitude of triangle is the perpendicular drawn from a vertex of a triangle to its opposite sides. A triangle has three altitudes.

Here Ad is the altitude corresponding to the side BC.

9. A triangle has three altitudes and all the three altitudes are always concurrent.

10. The point of intersection of the altitudes of a triangle is called the orthocentre.
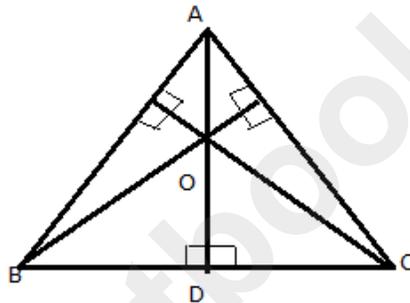
Here, O is the Orthocentre of the triangle ABC.

## Relation between sides and angles of triangles

1. If all the sides of a triangle are of different lengths, its angles are also of different measures in such a way that the greater side has greater angle opposite to it.

2. The greater angle has greater side opposite to it.

3. If any two sides of a triangle are equal, the angles opposite to them are also equal.

4. If any two angles of a triangle are equal, the sides opposite to them are also equal.

5. If all the sides of a triangle are equal, all its angles are equal.

6. If all the angles of triangle are equal, all its sides are also equal.

Important Theorems

1. If one side of a triangle is produced, the exterior angle so formed is greater than each of the interior opposite angles.

2. A triangle cannot have more than one right angle.

3. A triangle cannot have more than one obtuse angle.

4. In a right angled triangle, the sum of the two acute angles is 90°.

5. In every triangle, at least two angles are acute.

6. If two angles of a triangle are equal to two angles of any other triangle, then the third angle of both the triangles are also equal.

Congruent Triangles

1. Two triangles are said to be congruent to each other, if all the sides and angles of one triangle are equal to the corresponding sides and angles of another triangle.
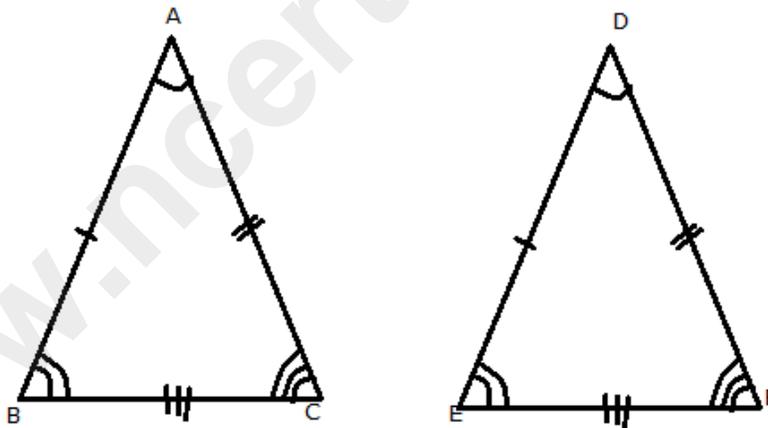

2. The symbol $\cong$ is read as "is congruent to"

3. Congruent triangles always coincide by superposition.

4. In congruent triangles, the sides and angles that coincide by superposition are called corresponding sides and corresponding angles.

5. The corresponding sides lie opposite to the equal angles and corresponding angles lie opposite to the equal sides.

6. In congruent triangles, corresponding parts are equal. We write in short '$C\,P\,C\,T\,C$' for corresponding parts of congruent triangles.

Conditions for Congruency of Triangles
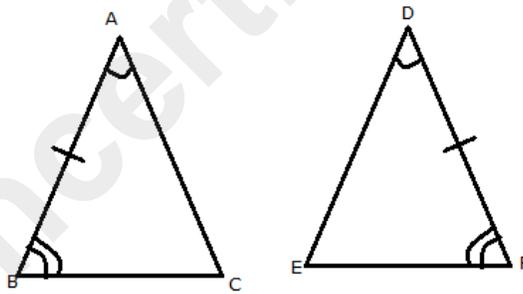
1. SAS congruence condition:
Two triangles are congruent if two sides and the included angle of one triangle are equal to the two sides and the included angle of the other triangle.
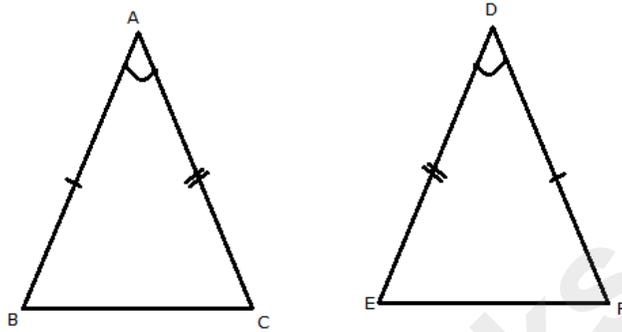
Here $\triangle ABC \cong \triangle DFE$ by SAS congruency criteria
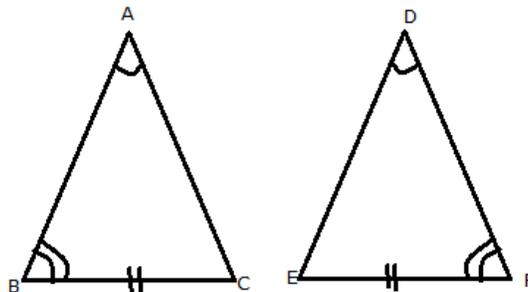
2. ASA congruence condition:
Two triangles are congruent if two angles and the included side of one triangle are equal to two angles and the included side of other triangle.

Here, $\triangle ABC \cong \triangle DFE$ by ASA congruency criteria.
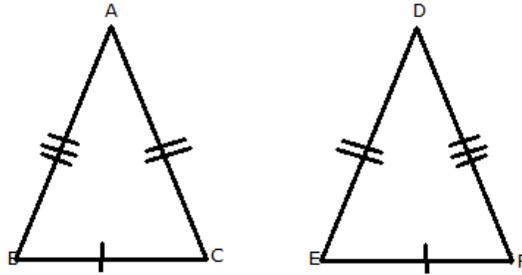
3. AAS congruence condition:
Two triangles are congruent if any two pairs of angles and one pair of corresponding sides are equal.

Here, $\triangle ABC \cong \triangle DFE$ by AAS congruency criteria

4. SSS congruent condition:
   If three sides of one triangle are equal to the three sides of another triangle, then the two triangles are congruent.

   Here, $\triangle ABC \cong \triangle DFE$ by SSS congruency criteria

5. RHS congruence condition:
   If in two right triangles the hypotenuse and one side of one triangle are equal to the hypotenuse and one side of the other triangle, then the two triangles are congruent.
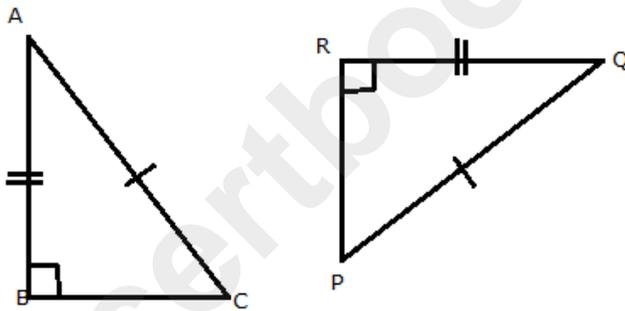
   Here, $\triangle ABC \cong \triangle QRP$ by RHS congruency criteria.

Important Points in Naming Convention

1. The order of vertices of two congruent triangles must be written in such a way that the corresponding vertices occupy the same position.

2. The above procedure is used for similar triangles.