MODULE 2/3

CLASS –VII MATHEMATICS

CHAPTER 7
CONGRUENCE OF TRIANGLES

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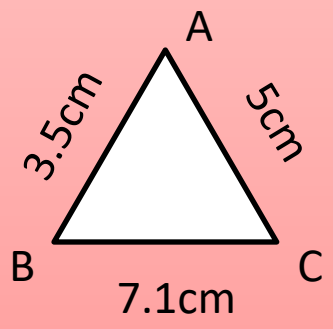
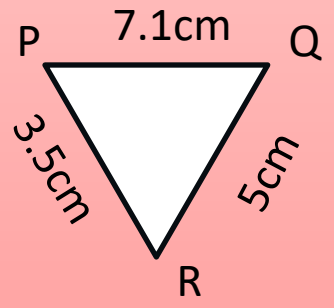
There are basically four congruence conditions for triangles.

1. SSS congruence
2. SAS congruence
3. ASA congruence
4. RHS congruence

1] Side-Side-Side (SSS) congruence of triangles.

Consider two triangles ABC and PQR in which length of the three sides of each triangle is given.



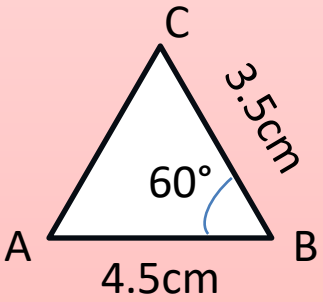


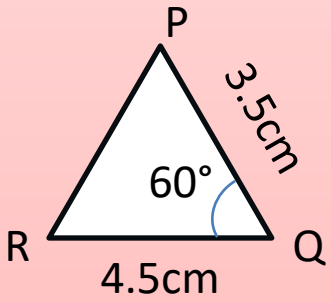
$AB=PR=3.5$ cm
$BC=PQ=7.1$ cm
and $AC=QR=5$cm
This shows that the three sides of one triangle are equal to the corresponding three sides of the other triangle. So by SSS congruence rule the two triangles are congruent.
From the above three equality relations, it can be easily seen that $A\leftrightarrow R$, $B\leftrightarrow P$ and $C\leftrightarrow Q$.
So we have $ABC \cong RPQ$.

<u>SSS congruence criterion</u>
If under a given correspondence, the three sides of one triangle are equal to three corresponding sides of the other triangle, then the triangles are congruent.

2] Side-Angle-Side (SAS) congruence

Let there be ΔABC and ΔPQR such that $AB=4.5cm$, $BC= 3.5cm$ and $\angle B=60°$.
Also $QR=4.5cm$, $PQ=3.5cm$ and $\angle Q=60°$.





Make a trace copy of ABC and superimpose it on the triangle PQR so that $AB \leftrightarrow RQ$ and $BC \leftrightarrow PQ$, $\angle B \leftrightarrow \angle Q$. Thus, we find that two triangles cover each other exactly.
Hence, $\Delta ABC \cong \Delta RQP$.

We can also verify the congruence by measuring the sides AC and PR and also another pair of angles say $\angle A$ and $\angle R$.
We find AC=4.5cm, PR=4.5cm, $\angle A = 50°$ and $\angle R = 50°$.
We observe that AC=PR, $\angle A = \angle R$ and AB=RQ.
Therefore, $\Delta ABC \cong \Delta RQP$.

<u>SAS congruence criterion</u>
If under a correspondence, two sides and the angle included between them of a triangle are equal to two corresponding sides and the angle included between them of another triangle, then the triangles are congruent.

Eg 1: Given below the measures of some parts of two triangles. Examine whether the two triangles are congruent or not using SAS congruence criterion.

In ΔXYZ; XY=6cm, YZ=8cm, $\angle Y = 47°$.

In ΔQRP; QR=6cm, PR=8cm, $\angle R = 47°$.

Soln: Let us make a rough sketch of the triangles before examining their congruence.

Clearly, here XY=QR=6cm.

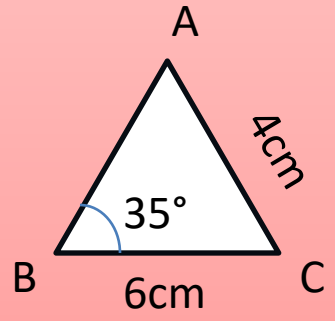
ZY=PR=8cm and $\angle Y = \angle R = 47°$ (included angles).

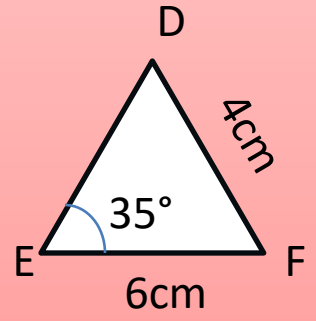
Thus by SAS congruence criteria, $\Delta XYZ \cong \Delta QRP$

Eg 2: Given ΔABC in which BC=6cm, AC=4cm and $\angle B=35°$. ΔDEF in which DF=4cm, EF= 6cm and $\angle E=35°$. Examine whether the two triangles are congruent or not.

Soln: Here BC= EF, AC=DF and $\angle B = \angle E$. But $\angle B$ is not the included angle between the sides AC and BC.

Similarly, $\angle E$ is not the included angle between the sides EF and DF. So ΔABC and ΔDEF are not congruent by SAS criterion.





Thank You