MODULE 3/3

CLASS-VII MATHEMATICS

CHAPTER-7
CONGRUENCE OF TRIANGLES

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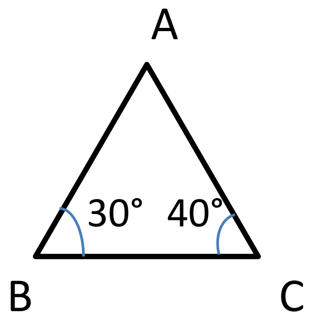
3. ASA (Angle-Side- Angle) Congruence

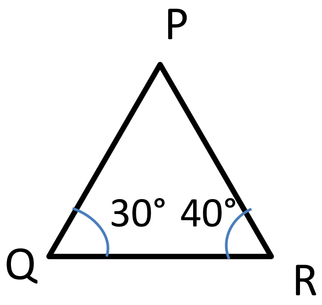
Let there be a ΔABC, with BC = 2cm, $\angle B = 30°$, $\angle C = 40°$

Draw another triangle PQR with QR = 2cm, $\angle Q = 30°$, $\angle R = 40°$.

In this way we have a pair of triangles such that BC= QR= 2cm, $\angle B = \angle Q = 30°$, $\angle C = \angle R = 40°$.

Trace a copy of ΔABC and superimpose it on ΔPQR. You will observe that both the triangles cover each other exactly. Thus $\Delta ABC \cong \Delta PQR$.

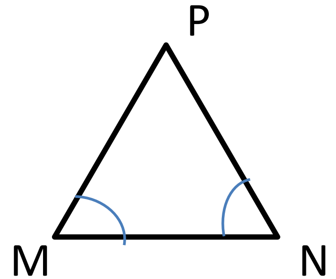




ASA congruence criterion.

If under a correspondence, two angles and the included side of a triangle are equal to two corresponding angles and the included side of another triangle, then the two triangles are congruent.

Q1. What is the side included between the angles M and N of ΔMNP.



Ans: The included side is MN.

Note(1): Included side means the side on which angles lie.
Note(2): Given two angles of a triangle, we can always find the third angle of the triangle, by angle sum property of a triangle. So whenever two angles and one side of a triangle are equal to the corresponding two angles and one side of another triangle, you may convert it into two angles and the included side form of congruence and then apply the ASA congruence.

4. Congruence of Right Angled Triangles.

In right angled triangles, we know the equality of two corresponding angles i.e the right angles.

Now, let a right angled ΔABC is given where $AB=3cm$, $\angle B = 90^\circ$, $AC=5cm$, $BC=4cm$.

Can we draw a copy of the triangle ABC, where $\angle B= 90^\circ$ and

(1) If $\angle C$ is known?

Clearly not, because vertex C cannot be fixed as shown in the fig.1

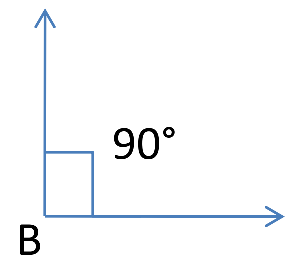


fig.1

(2) If only BC is known?

Clearly not, because vertex A cannot be fixed as shown in figure.2

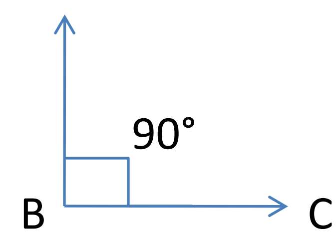


fig.2

(3) If $\angle A$ and $\angle C$ are also known?

Clearly not, because vertices A and C cannot be fixed as shown in fig.3.

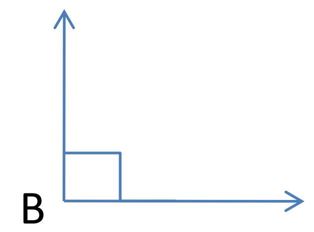


fig.3

(4) If AB and BC are known?

Clearly Yes, as shown in fig.4.

But this is SAS criterion.

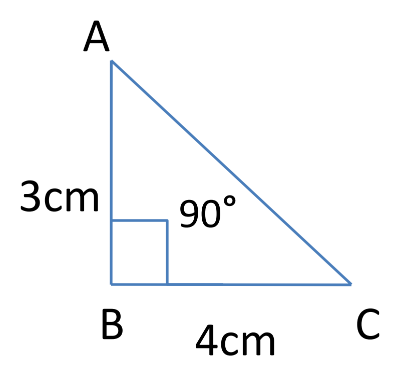


fig.4

(5) If AC and one of AB or BC are known?

Yes, as shown in fig.5

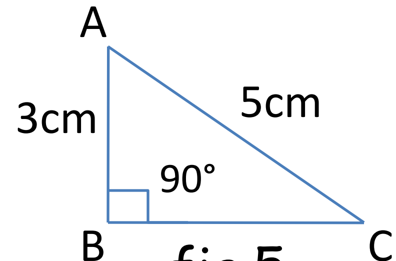


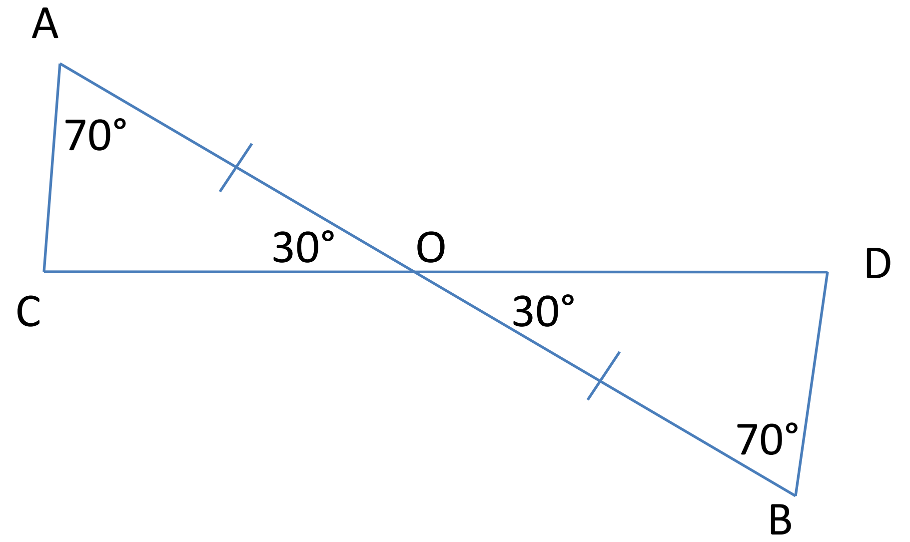
fig.5

Thus, we can make a copy of a right angled triangle if hypotenuse and one side of the triangle are known. This is known as RHS congruence condition.

<u>RHS (Right angle-Hypotenuse-side) congruence condition</u>

If under a correspondence, the hypotenuse and one side of a right- angled triangle are respectively equal to the hypotenuse and one side of another right angled triangle, then the triangles are congruent.

Eg 1:



In the figure AO=BO and $\angle$ A = $\angle$ B.

(i) Is $\angle$ AOC = $\angle$ BOD? Why?

(ii) Is ΔAOC $\cong$ ΔBOD by ASA congruence.

Soln: (i) Yes, $\angle$ AOC = $\angle$ BOD (V.O.A)

(ii) In ΔAOC and ΔBOD, we have

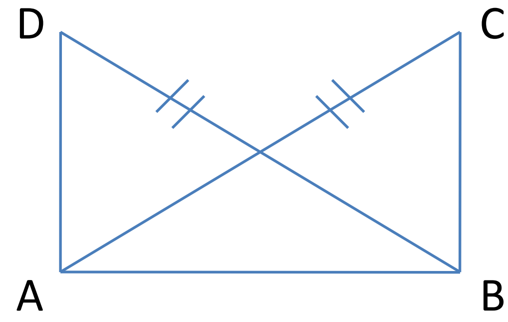
$\angle$ AOC= $\angle$ BOD (V.O.A)

AO= BO

$\angle$ AOC= $\angle$ DBO(given). Thus, ΔAOC $\cong$ ΔBOD.

Eg 2: In the figure $DA \perp AB$, $CB \perp AB$ and $AC = BD$. State the three pairs of equal parts in ΔABC and ΔDAB. Which of the following statements is meaningful?

(i) $\Delta ABC \cong \Delta BAD$. (ii) $\Delta ABC \cong \Delta ABD$.



Soln: The three pairs of equal parts are $\angle ABC = \angle BAD = 90^\circ$, $AC = BD$ (Given), $AB = BA$ (Common side).

From the above $\Delta ABC \cong \Delta BAD$ (By RHS congruence). So, (i) is true and (ii) is not meaningful in the sense that correspondence among the vertices is not satisfied.

Thank You