PERIOD 7

MATHEMATICS

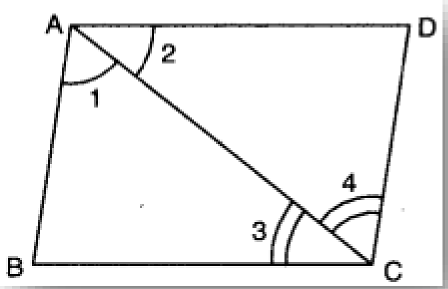
CHAPTER NUMBER :~ 7
CHAPTER NAME :~ TRIANGLES

Website: www.odmegroup.org
Email: info@odmps.org
Toll Free: 1800 120 2316
Sishu Vihar, Infocity Road, Patia, Bhubaneswar- 751024

PREVIOUS KNOWLEDGE TEST

In the given figure, if ∠1 = ∠2 and ∠3 = ∠4, then prove that BC = CD.

Solution:



LEARNING OUTCOME:~

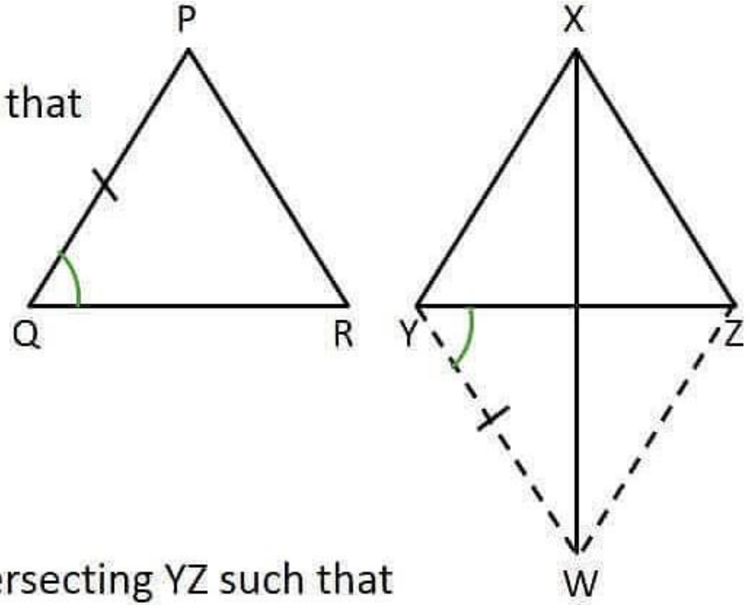
1.Students will be able to learn SSS and RHS congruence rule.

SSS CONGRUENCE RULE :~

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

Given :- Δ PQR & Δ XYZ such that

PQ = XY , QR = YZ , PR = XZ



To Prove :- ΔPQR ≅ ΔXYZ

Construction:- Draw XW intersecting YZ such that

∠WYZ = ∠PQR and WY = PQ.

Also, Join WZ

Proof:-

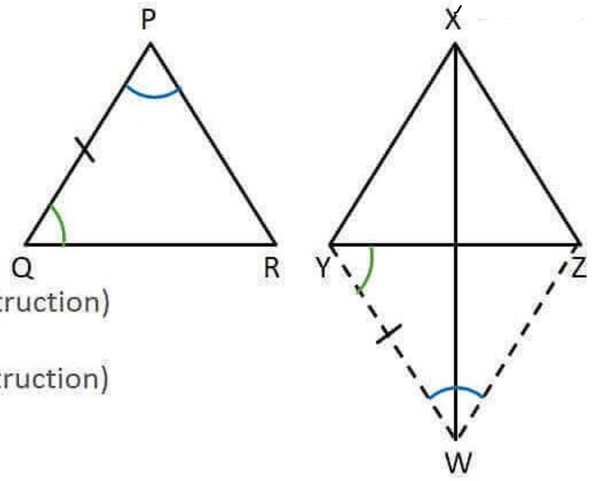
In ΔPQR and ΔWYZ

PQ = WY (By construction)

∠PQR = ∠WYZ (By construction)

QR = YZ (Given)

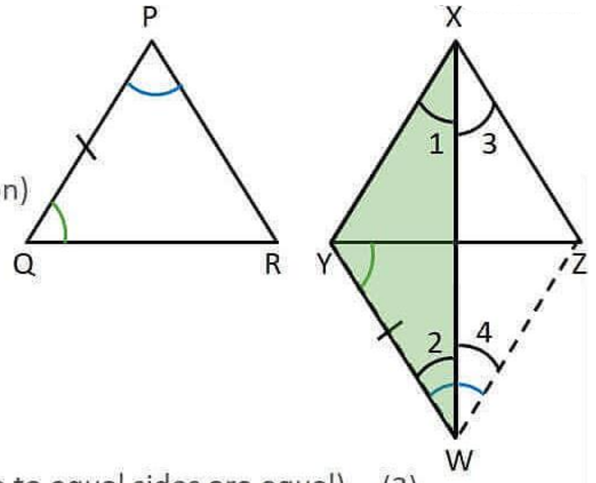
ΔPQR ≅ ΔWYZ (SAS Congruency)



Thus, ∠W = ∠P (CPCT) ...(1)

In Δ XYW

Since PQ = WY (By construction)



and PQ = XY (Given)

$\therefore$ WY = XY

$\Rightarrow \angle 1 = \angle 2$ (Angles opposite to equal sides are equal) ...(2)

Similarly, we can prove

$\angle 3 = \angle 4$ ...(3)

Adding (2) and (3) we get

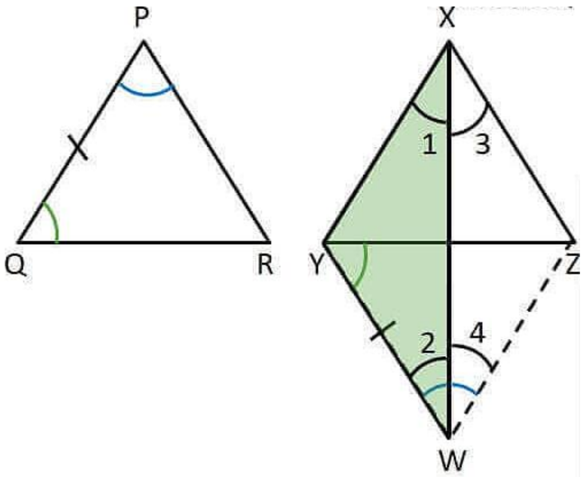
$\angle 1 + \angle 3 = \angle 2 + \angle 4$

$\Rightarrow \angle X = \angle W$

$\Rightarrow \angle X = \angle W$

From (1), $\angle W = \angle P$

$\therefore \angle P = \angle X$ ...(4)



Now in ΔPQR and ΔXYZ

PQ = XY (Given)

$\angle P = \angle X$ (From (4))

PR = XZ (Given)

$\Rightarrow \Delta PQR \cong \Delta XYZ$ (SAS congruency)

Hence Proved.

RHS CONGRUENCE RULE :~

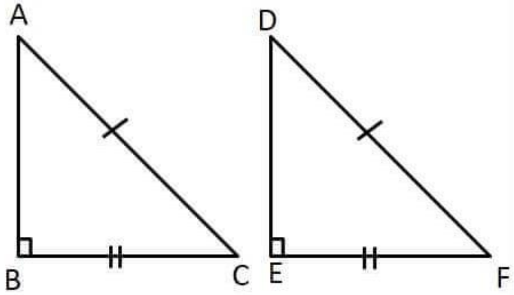
If in two right triangles the hypotenuse and one side of one triangle are equal to the hypotenuse and one side of the other triangle, then the two triangle are congruent.

Given :- Two right triangles ΔABC and ΔDEF where

$\angle B = 90°$ & $\angle E = 90°$,

hypotenuse is equal i.e. $AC = DF$

& one side is equal i.e. $BC = EF$



To Prove :- $\Delta ABC \cong \Delta DEF$

Proof:-

In right ΔABC

By Pythagoras theorem

$$AC^2 = AB^2 + BC^2$$

$$AB^2 = AC^2 - BC^2 \quad ...(1)$$

In right ΔDEF

By Pythagoras theorem,

$$DF^2 = DE^2 + EF^2$$

$$DE^2 = DF^2 - EF^2 \quad ...(2)$$

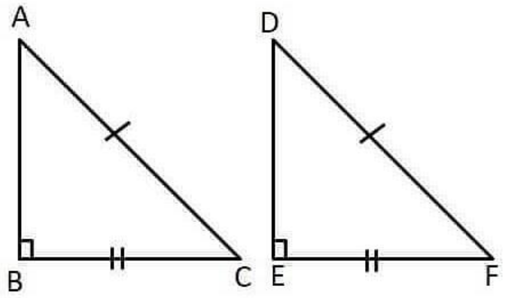
From (1)

$$AB^2 = AC^2 - BC^2$$

$$AB^2 = DF^2 - EF^2$$ *($\because$ AC = DF & BC = EF (given))*

$$AB^2 = DE^2$$ (From (2))

AB = DE ...(3)



$\therefore$ In ΔABC and ΔDEF

AB = DE (From 3)

BC = EF (Given)

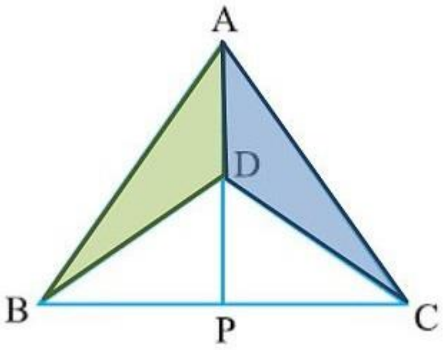
AC = DF (Given)

$\Rightarrow$ ΔABC ≅ ΔDEF (By SSS congruence rule)

Hence proved

Δ ABC and Δ DBC are two isosceles triangles on the same base BC and vertices A and D are on the same side of BC (see figure). If AD is extended to interest BC at P, show that

(i) Δ ABD ≅ Δ ACD



Given:

ΔABC is isosceles,

AB = AC ...(1)

Also, ΔDBC is isosceles,

DB = DC ...(2)

To prove: Δ ABD ≅ Δ ACD

Proof :

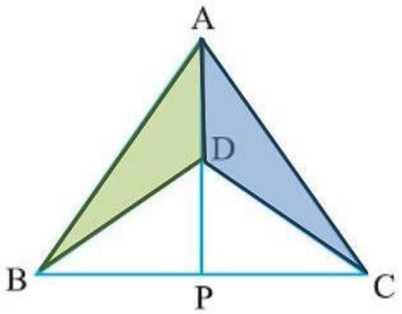
In ΔABD and Δ DBC, we have

AB = AC *(From (1))*

BD = DC *(From (2))*

AD = AD *(Common)*

Δ ABD ≅ Δ ACD *(SSS congruence rule)*



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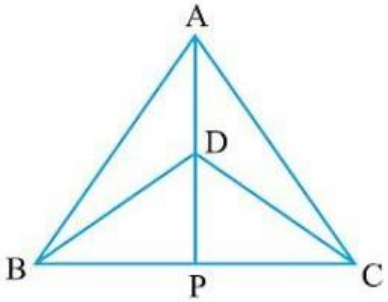
(iv) AP is the perpendicular bisector of BC



To prove: BP = CP & $\angle APB = \angle APC = 90^{\circ}$

Proof

From part(ii) , Δ ABP $\cong$ Δ ACP

BP = CP *(CPCT)*

$\angle APB = \angle APC$ *(CPCT)*

Since BC is a line,

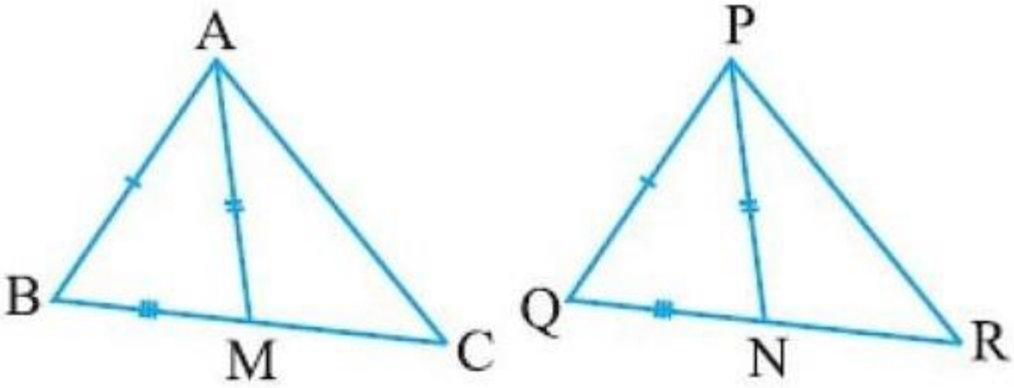
$\therefore \angle APB + \angle APC = 180^{\circ}$ *(Linear Pair)*

$\angle APB + \angle APB = 180^{\circ}$

$2\angle APB = 180^{\circ}$

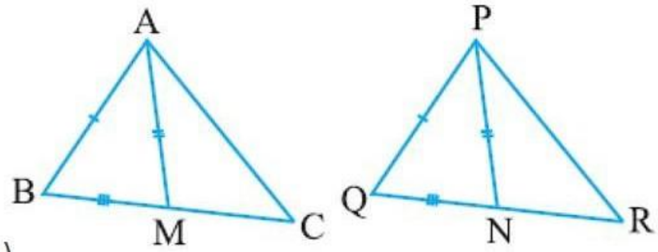
Two sides AB and BC and median AM of one triangle ABC are respectively equal to sides PQ and QR and median PN of Δ PQR (see figure).Show that :

(i) Δ ABM ≅ Δ PQN



Two sides AB and BC and median AM of one triangle ABC are respectively equal to sides PQ and QR and median PN of Δ PQR (see figure).Show that :

(i) Δ ABM ≅ Δ PQN



Given:

AB = PQ ...(1)

BC = QR ...(2)

& AM = PN ...(3)

Also, AM is the median of Δ ABC

So, $BM = CM = \frac{1}{2} BC$

Also, PN is the median of Δ PQR

So, $QN = RN = \frac{1}{2} QR$

To prove: Δ ABM ≅ Δ PQN

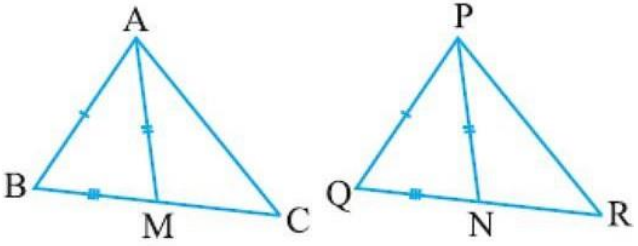
Proof

Since

$BC = QR$

$\frac{1}{2} BC = \frac{1}{2} QR$

$BM = QN$ ...(4)



In Δ ABM & Δ PQN

$AB = PQ$ *(From (1))*

$AM = PN$ *(From (3))*

$BM = QN$ *(From (6))*

So, $\Delta ABM \cong \Delta PQN$ *(SSS congruence rule)*

HOMEWORK ASSIGNMENT

Exercise 7.3

Practice question number 1,2,3

AHA

1. IF P IS A POINT EQUIDISTANT FROM TWO LINES L AND M INTERSECTING AT A POINT A .SHOW THAT THE LINE BISECTS THE ANGLE BETWEEN THEM.

THANKING YOU

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