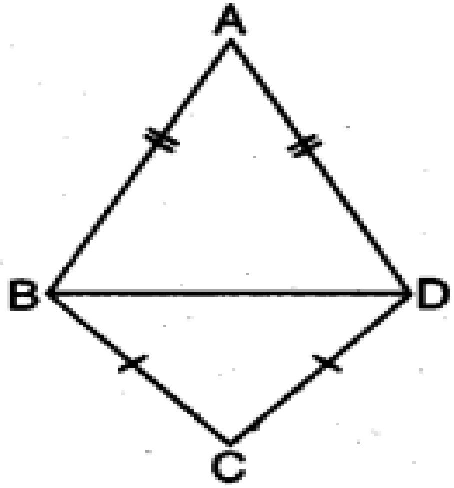
PERIOD 5

MATHEMATICS

CHAPTER NUMBER :~ 7
CHAPTER NAME :~ TRIANGLES

PREVIOUS KNOWLEDGE TEST

In the given figure, ΔABD and ABCD are isosceles triangles on the same base BD. Prove that $\angle ABC = \angle ADC$.



LEARNING OUTCOME:~

1.Students will be able to learn more properties of triangle.

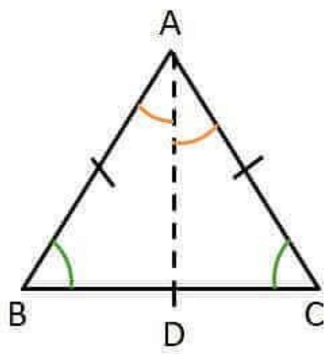
2. Students will be able to learn some properties of isosceles triangle.

THEOREM 7.2~

Angles opposite to equal sides of an isosceles triangles are equal.

Given :- Isosceles triangle ABC

i.e. AB = AC



To Prove :- ∠B = ∠C

Construction:- Draw a bisector of ∠A intersecting BC at D.

Proof:-

In △BAD and △CAD

AB = AC (Given)

∠BAD = ∠CAD (By Construction)

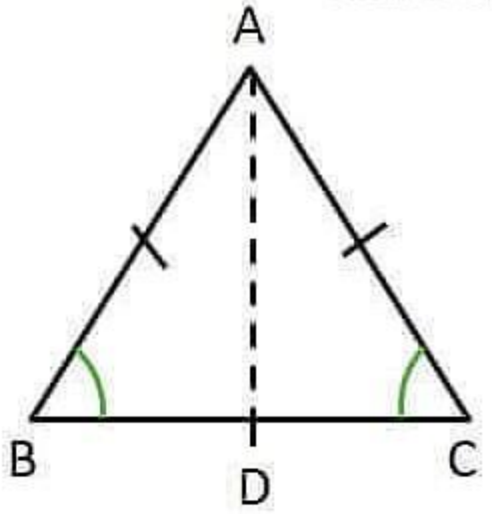
AD = AD (Common)

△BAD ≅ △CAD (By SAS congruence rule)

Thus,

$\angle ABD = \angle ACD$ (By CPCT)

$\Rightarrow \angle B = \angle C$



Hence, angles opposite to equal sides are equal.

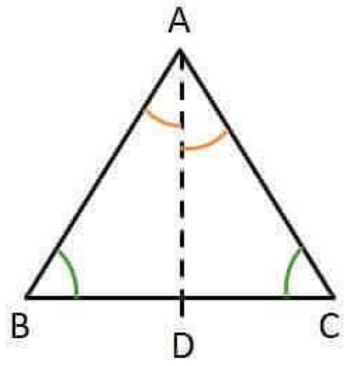
Hence proved

THEOREM 7.3~

The sides opposite to equal angles of a triangle are equal.

Given :- A triangle ABC where

$\angle B = \angle C$



To Prove :- AB = AC

Construction:- Draw a bisector of $\angle A$ intersecting BC at D.

Proof:-

In $\triangle BAD$ and $\triangle CAD$

$\angle B = \angle C$ (Given)

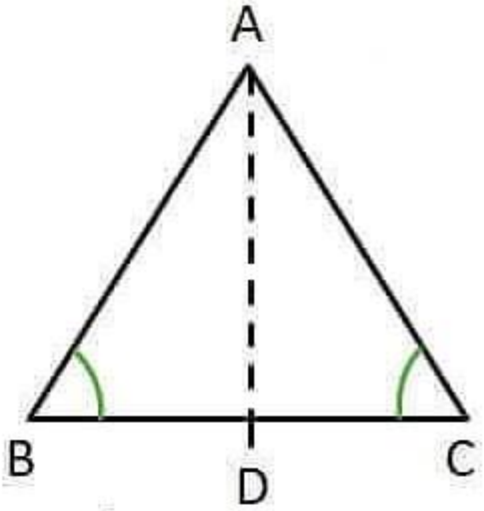
$\angle BAD = \angle CAD$ (By Construction)

$AD = AD$ (Common)

$\triangle BAD \cong \triangle CAD$ (By AAS congruence rule)

Thus,

AB = AC (By CPCT)

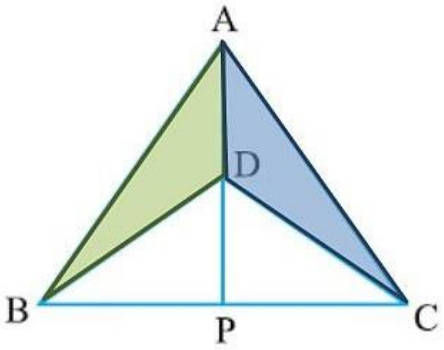


Hence, sides opposite to equal angles are equal.

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,

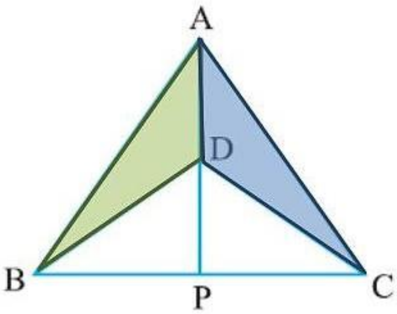
DB = DC ...(2)

To prove: Δ ABD ≅ Δ ACD

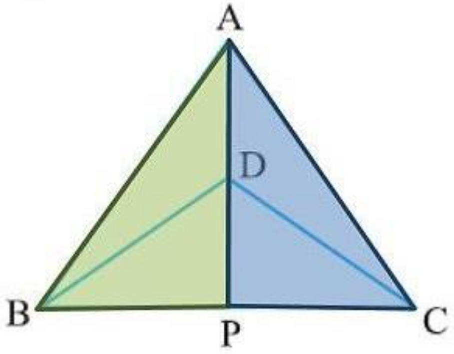
Proof :

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)*



(ii) Δ ABP ≅ Δ ACP



From part (i),

Δ ABD ≅ Δ ACD

So, ∠BAP = ∠PAC *(CPCT)* ...(1)

In ΔABP and Δ ACP,

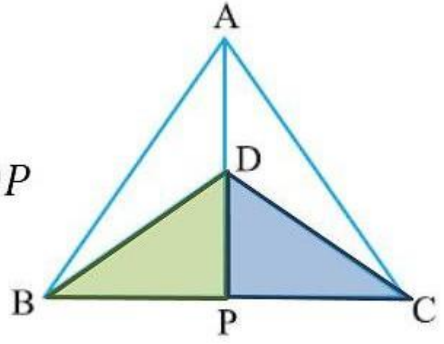
AB = AC *(Given)*

∠BAP = ∠PAC *(From (1))*

AP = AP *(Common)*

Δ ABP ≅ Δ ACP. *(SAS congruence rule)*

(iii)AP bisects $\angle A$ as well as $\angle D$.



To prove: $\angle BAD = \angle CAD$ & $\angle BDP = \angle CDP$

Proof:

From part (i) , Δ ABD ≅ Δ ACD

So, $\angle BAD = \angle CAD$. *(CPCT)*

Hence AP bisects ∠ A

For $\angle BDP = \angle CDP$,

we will first prove Δ BDP ≅ Δ CDP

From part(ii) , Δ ABP ≅ Δ ACP

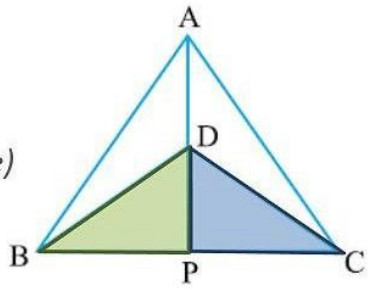
BP = CP ...(1)

In Δ BDP and CDP, we have

BD = CD *(Given)*

BP = CP *(From (1))*

DP = DP *(Common)*



So, Δ BDP $\cong$ Δ CDP *(SSS congruence rule)*

$\Rightarrow$ $\angle BDP = \angle PDC$ *(CPCT)*

Thus, AP bisects $\angle$ D

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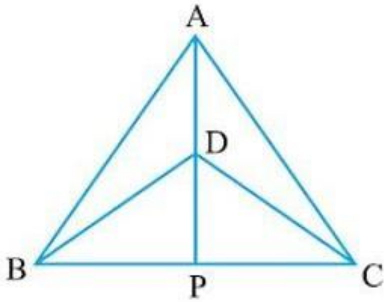
(iv) AP is the perpendicular bisector of BC



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

Proof

From part(ii) , Δ ABP ≅ Δ ACP

BP = CP *(CPCT)*

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

Since BC is a line,

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

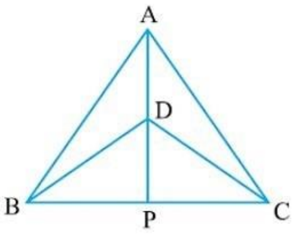
$\angle APB + \angle APB = 180^\circ$

$2\angle APB = 180^\circ$

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

$$\angle APB = 90^\circ$$

So, $\angle APB = \angle APC = 90^\circ$



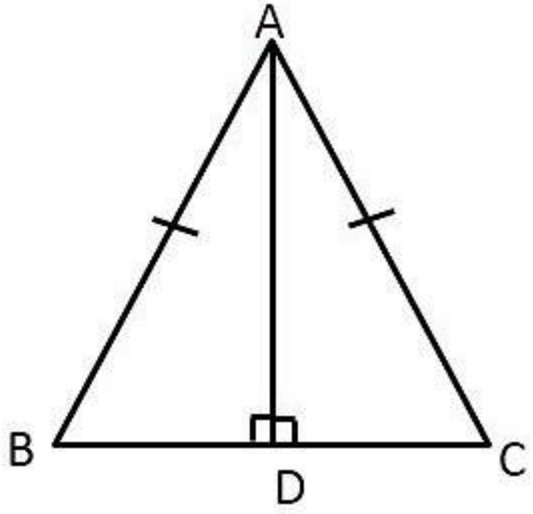
Since, BP = CP

& $\angle APB = \angle APC = 90^\circ$

$\Rightarrow$ AP is perpendicular bisector of BC.

AD is an altitude of an isosceles triangle ABC in which AB = AC . Show that

(i) AD bisects BC , (ii) AD bisects $\angle A$.



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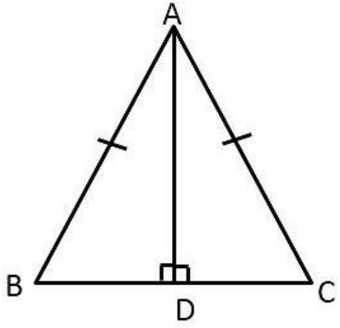


Given:

Δ ABC is an isosceles triangle,

So, AB = AC ...(1)

Also, AD is the altitude

So, $\angle ADC = \angle ADB = 90^{\circ}$ ...(2)

To prove: (i) BD = CD & (ii) $\angle BAD = \angle CAD$

Proof

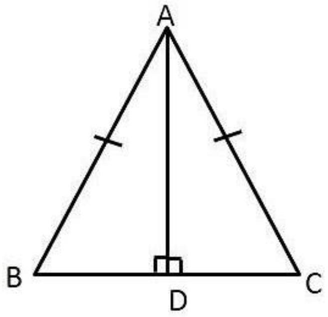
In ΔADB and ΔADC

$\angle ADC = \angle ADB = 90°$ *(Both 90°)*

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

$AD = AD$ *(Common)*

$\therefore \Delta ADB \cong \Delta ADC$ *(R.H.S Congruency)*



Hence, by CPCT

$\Rightarrow BD = DC$

and $\angle BAC = \angle DAC$

Hence proved

HOMEWORK ASSIGNMENT

Exercise 7.3

Question number 1,2

AHA

1. If Δ PQR $\cong$ Δ EDF, then is it true to say that PR = EF? Give reason for your answer.
2. In Δ PQR, $\angle P = 70°$ and $\angle R = 30°$. Which side of this triangle is the longest? Give reason for your answer.

THANKING YOU

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