Ex 7.3

1) It is given that ΔABD & ΔACD are two isosceles triangles.

Given ~~it~~

To Prove that : i) $\Delta ABD \cong \Delta ACD$

ii) $\Delta ABP \cong \Delta ACD$

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

iv) AP is the Perpendicular bisector of BC.

i) Prove that $\Delta ABD \cong \Delta ACD$.

S: AD = AD (common)

S: AB = AC (isosceles triangle :- two sides are of equal length In ΔABC)

S: BD = CD (Since ΔDBC is isosceles)

$\therefore \Delta ABD \cong \Delta ACD$ (By SSS Criteria) (Proved)

ii) Prove that $\Delta ABP \cong \Delta ACP$

S: AP = AP (common)

A: $\angle PAB = \angle PAC$ (by cpct in $\Delta ABD \cong \Delta ACD$)

S: AB = AC (Since ΔABC is isosceles triangle).

$\therefore \Delta ABP \cong \Delta ACP$ (by SAS criteria) (Proved)

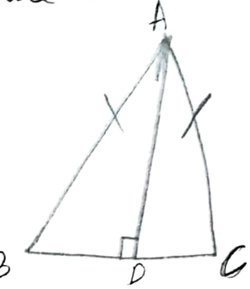
iii) $\angle PAB = \angle PAC$ by CPCT as $\Delta ABD \cong \Delta ACD$.

iv) $\angle BPD = \angle CPD$ (By cpct as $\triangle BPD \cong \triangle CPD$)
& $BP = CP$ --- (1)
also, since BC is a straight line.
$\angle BPD + \angle CPD = 180^\circ$ (Linear Pair)
$\Rightarrow 2\angle BPD = 180^\circ$
$\Rightarrow \angle BPD = \frac{180^\circ}{2} = 90^\circ$ — (11)

Now, from the equation (1) & (11) we can say that AP is Perpendicular bisector of BC.

2) AD is an altitude of an isosceles triangle ABC in which $AB = AC$. (given)

Figure will be :-



Prove that
i) AD bisects BC
ii) AD bisects $\angle A$

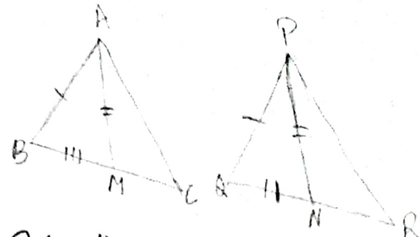
i) In $\triangle ABD$ & $\triangle ACD$.

R: $\angle ADB = \angle ADC$ (90° each)
H: $AB = AC$ (given)
S: $AD = AD$ (common)

$\therefore \triangle ABD \cong \triangle ACD$ (by RHS Criteria)
$BD = CD$ (CPCT)
So, AD bisects BC. (Proved)

ii) By CPCT, $\angle BAD = \angle CAD$
$\therefore$ AD bisects $\angle A$ (Proved)

3)



Prove that i) $\Delta ABM \cong \Delta PQN$
ii) $\Delta ABC \cong \Delta PQR$.

Given :-

$AB = PQ$

$BC = QR$

$AM = PN$

i) $1/2\, BC = BM$ & $1/2\, QR = QN$ (AM & PN are medians)

Also, $BC = QR$ (given)

~~⇒ BM = Q~~

So, $1/2\, BC = 1/2\, QR$

$\Rightarrow BM = QN$

In ΔABM & ΔPQN,

S: $AB = PQ$ (given)

S: $BM = QN$ (Proved above)

S: $AM = PN$ (given)

$\therefore \Delta ABM \cong \Delta PQN$ (By SSS criteria)

ii) In ΔABC & ΔPQR

S: $AB = PQ$ (given)

A: $\angle ABC = \angle PQR$ (By CPCT)

S: $BC = QR$ (given)

$\Delta ABC \cong \Delta PQR$ (SAS Criteria)

4) BE & CF = two equal altitudes (given)

Now, in $\triangle BEC$ & $\triangle CFB$

~~BE = CF~~

R: $\angle BEC = \angle CFB$ (90° each)

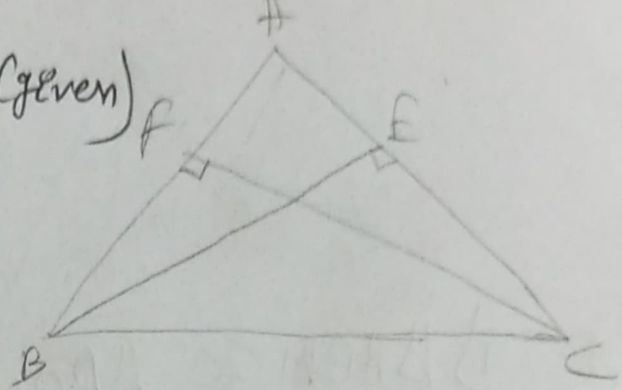
H: $BC = CB$ (common)

S: $BE = CF$ (common)

$\therefore \triangle BEC \cong \triangle CFB$ (RHS Criteria)

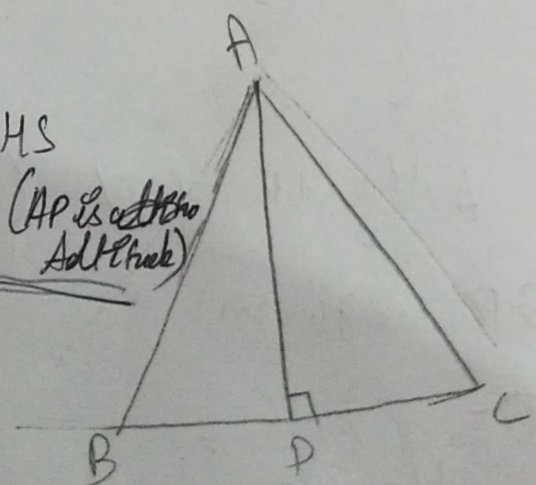
Also, $\angle C = \angle B$ (cpct)

So, $AB = AC$ (opposite to the equal angles is always equal)



5) Given → $AB = AC$

$\triangle ABP$ & $\triangle ACP$ are same by RHS Congruency as $\angle APB = \angle APC = 90^\circ$ (AP is altitude)



R: $\angle APB = \angle APC$ (90° each)

H: $AB = AC$ (given)

S: $AP = AP$ (common)

$\therefore \triangle ABP \cong \triangle ACP$ (RHS Criteria)

$\angle B = \angle C$ (by cpct)

③