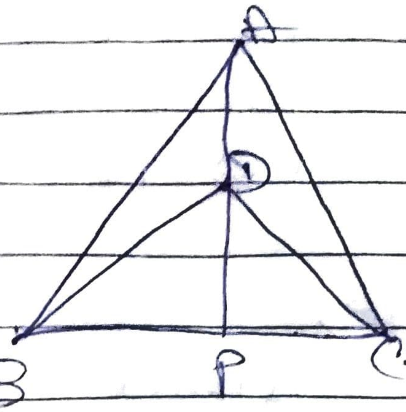
Exercise - 7.3



Given,
ΔABC and ΔDBC
are two isosceles triangle

Prove :- (i) $\Delta ABD \cong \Delta ACD$
(ii) $\Delta ABP \cong \Delta ACP$
(iii) AP bisects $\angle A$ as well as $\angle D$.
(iv) AP is the perpendicular bisector of BC.

Proof:- (i) In ΔABD and ΔACD
→ AD = AD (common)
AB = AC (Since ΔABC is isosceles)
BD = CD (since ΔACD is isosceles)
∴ $\Delta ABD \cong \Delta ACD$. (SSS)

(ii) ΔABP and ΔACP are similar as:
AP = AP (common)
$\angle PAB = \angle PAC$ (by CPCT since $\Delta ABD \cong \Delta ACD$)
AB = AC (since ΔABC is isosceles)
So, $\Delta ABP \cong \Delta ACP$ (SAS)

(iii) $\angle PAB = \angle PAC$ by CPCT as $\Delta ABD \cong \Delta ACD$.
AP bisects $\angle A$. ------ (i)
Also,
ΔBPD and ΔCPD

PD = PD (common)
BD = CD (since ΔDBC is isosceles)
BP = CP (CPCT as $\Delta ABP \cong \Delta ACP$)

So,

$\Delta BPD \cong \Delta CPD$ (SSS)

Thus,

$\angle BDP = \angle CDP$ (by CPCT) ---(ii)

Now,

by comparing (i) and (ii) it can be said that AP bisects A as well as D.

iv) BPD = CPD (by CPCT as $\Delta BPD \cong \Delta CPD$)
and
BP = CP ---(i)

Also,

BPD + CPD = 180° (since BC is a straight line).

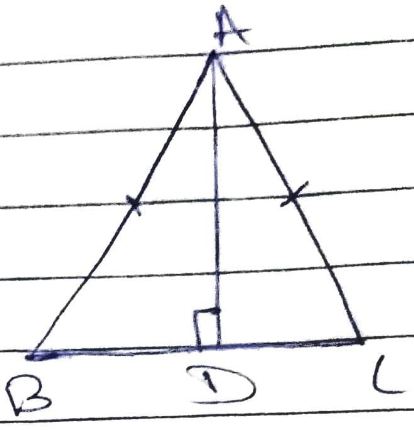
$\Rightarrow$ 2 BPD = 180°
BPD = 90° ---(ii)

Now,

from equations (i) and (ii) it can be said that :-

AP is the perpendicular bisector of BC

2Ans. It is given that AD is an altitude and AB = AC. The diagram is as follows.



Prove :- (i) AD bisects BC
(ii) AD bisects $\angle A$.

Proof :- (i) In $\triangle ABD$ and $\triangle ACD$,

$\angle ADB = \angle ADC = 90^\circ$
AB = AC (given)
AD = AD (common)

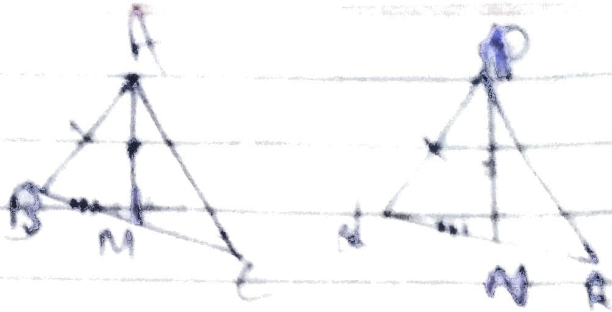
$\therefore$ $\triangle ABD \cong \triangle ACD$ (RHS)

Now,
by the Rule of CPCT

BD = CD
So, AD bisects BC

(ii) Again, by the rule of CPCT,

$\angle BAD = \angle CAD$
Hence,
AD bisects $\angle A$



Given,

$AB = PQ$

$BC = QR$

$AM = PN$

Prove :- (i) $\Delta ABM \cong \Delta PQN$

(ii) $\Delta ABC \cong \Delta PQR$

Proof :- (i) $\frac{1}{2} BC = BM$ (Since AM and

$\frac{1}{2} QR = QN$ (PN are median)

Also,

$BC = QR$

So,

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

$\Rightarrow BM = QN$

In ΔABM and ΔPQN,

$AM = PN$ (given)

$AB = PQ$ (given)

$BM = QN$ (proved)

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

(ii) In ΔABC and ΔPQR

$AB = PQ$ (given)

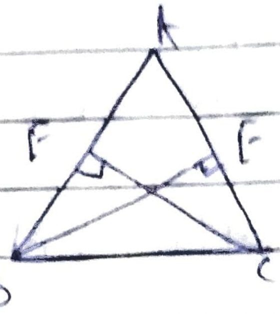
$BC = QR$ (given)

$\angle ABC = \angle PQR$ (CPCT)

So,

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

It is given that BE and CF are two equal altitudes of ΔABC



Prove that :- ΔABC is an isosceles triangle

Proof :- Now,

In ΔBEC and ΔCFB,

BEC = CFB = 90° (Same altitudes)
BC = CB (common)
BE = CF (common)

So,

$\Delta BEC \cong \Delta CFB$ (RHS)

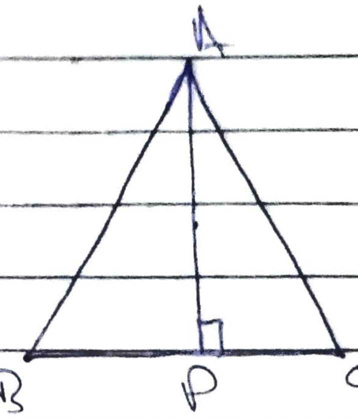
Also,

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

Therefore,

AB = AC as sides opposite to the equal angles is always equal.

It is given that $AB = AC$



Prove :- $\angle B = \angle C$.

Proof :- In ΔABP and ΔACP

$\angle APB = \angle APC = 90^\circ$ (AP is altitude)

$AB = AC$ (given)

$AP = AP$ (Common)

So,

$\Delta ABP \cong \Delta ACP$ (RHS)

So, $\angle B = \angle C$ (CPCT)