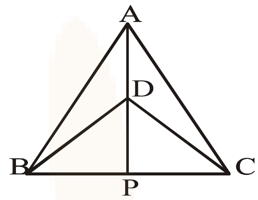
# CLASS IX: MATHS
## Chapter 7: Triangles

## Questions and Solutions | Exercise 7.3 - NCERT Books

**Q1.** ΔABC and ΔDBC 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 intersect BC at P, show that




(i) ΔABD ≅ ΔACD
(ii) ΔABP ≅ ΔACP
(iii) AP bisects ∠A as well as ∠D
(iv) AP is the perpendicular bisector of BC.

**Sol.** In ΔABD and ΔACD,

AB = AC (∵ ΔABC is isosceles)
DB = DC (∵ ΔDBC is isosceles)
AD = AD (Common side)
∴ ΔABD ≅ ΔACD (By SSS congruence rule)
(ii) Now, ΔABD ≅ ΔACD
⇒ ∠BAD = ∠CAD (By CPCT) ...(1)
In ΔABP and ΔACP,
AB = AC (∵ ΔABC is isosceles)
⇒ ∠BAP = ∠CAP (By 1)
AP = AP (common side)
∴ ΔABP ≅ ΔACP (By SAS congruence rule)
(iii) ΔABD ≅ ΔADC (Proved above)
∠BAD = ∠CAD (by CPCT)
∠ADB = ∠ADC (by CPCT)
180 – ∠ADB = 180– ∠ADC
⇒ ∠BDP = ∠CDP
AP bisects ∠A as well as ∠D
(iv) ΔABP ≅ ΔACP
⇒ BP = CP (By CPCT)

⇒ AP bisects BC

∠APB = ∠APC (By CPCT)

∠APB + ∠APC = 180°

2∠APB = 180°

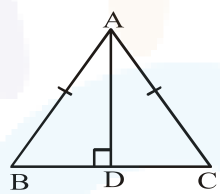
∠APB = 90°

AP is perpendicular bisector of BC

**Q2.** AD is an altitude of an isosceles triangle ABC in which AB = AC. Show that

(i) AD bisects BC (ii) AD bisects ∠A

**Sol.** Given : AD is an altitude of an isosceles triangle ABC in which AB = AC.




To Prove : (i) AD bisect BC. (ii) AD bisect ∠A.

Proof : (i) In right ΔADB and right ΔADC.

Hyp.AB = Hyp. AC

∠ADB = ∠ADC (Each 90°)

Side AD = side AD (Common)

ΔADB ≅ ΔADC (RHS rule)

⇒ BD = CD (By CPCT)

⇒ AD bisect BC

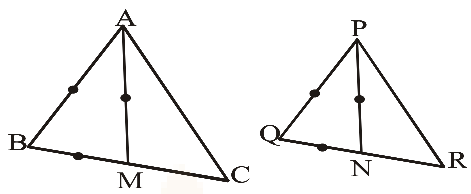
(ii) ΔADB ≅ ΔADC

∠BAD =∠CAD (By CPCT)

⇒ AD bisect ∠A

**Q3.** Two sides AB and BC and median AM of one triangle ABC are respectively equal to side PQ and QR and median PN of ΔPQR (see figure). Show that :

(i) ΔABM ≅ ΔPQN (ii) ΔABC ≅ ΔPQR




**Sol.** (i) $BM = \frac{1}{2}BC$ $\quad$ ($\because$ M is mid-point of BC)

$QN = \frac{1}{2}QR$ $\quad$ ($\because$ N is mid-point of QR)

$\Rightarrow BM = QN$ $\quad$ ($\because$ BC = QR is given)

Now, in $\Delta ABM$ and $\Delta PQN$, we have

AB = PQ $\quad$ (Given)

BM = QN $\quad$ (Proved)

AM = PN $\quad$ (Given)

$\therefore \Delta ABM \cong \Delta PQN$ $\quad$ (SSS congruence criteria)

(ii) $\Delta ABM \cong \Delta PQN$

$\Rightarrow \angle ABM = \angle PQN$

$\angle B = \angle Q$ $\quad$ (By CPCT)

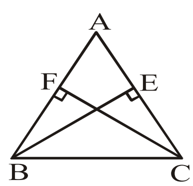
Now, in $\Delta ABC$ and $\Delta PQN$,

$AB = PQ$, $\angle B = \angle Q$ and $BC = QN$

$\Rightarrow \Delta ABC \cong \Delta PQN$ $\quad$ [by SAS cong.]

**Q4.** BE and CF are two equal altitudes of a triangle ABC. Using RHS congruence rule, prove that the triangle ABC is isosceles.

**Sol.** Given BE and CF are two altitude of $\Delta ABC$.



To prove : $\Delta ABC$ is isosceles.

Proof : In right $\Delta BEC$ and right $\Delta CFB$ side

BE = side CF (Given)

Hyp.BC = Hyp CB (Common)

$\angle BEC = \angle BFC$ (Each 90°)

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

$\therefore \angle BCE = \angle CBF$ (By CPCT)

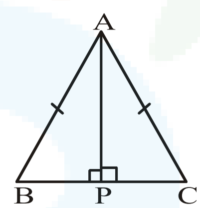
AB = AC

(Side opp. to equal angles are equal)

$\Delta ABC$ is isosceles.

**Q5.** ABC is an isosceles triangle with AB = AC. Draw AP ⊥ BC to show that $\angle B = \angle C$

**Sol.** In $\Delta APB$ and $\Delta APC$




AB = AC (Given)

$\angle APB = \angle APC$ (Each = 90°)

AP = AP (common side)

Therefore, by RHS congruence criteria, we have

$\Delta APB \cong \Delta APC$

$\Rightarrow \angle ABP = \angle ACP$ (By CPCT)

$\Rightarrow \angle B = \angle C$