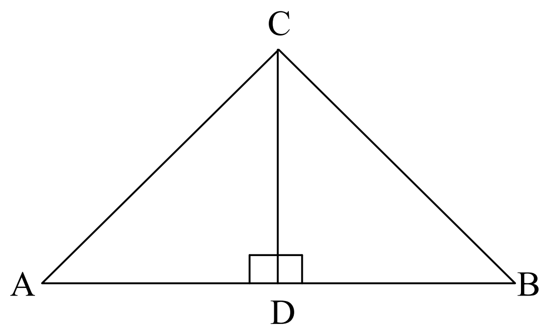
Problem – 1: In the figure, CD is the perpendicular bisector of AB, Prove that $\Delta ADC \cong \Delta BDC$.



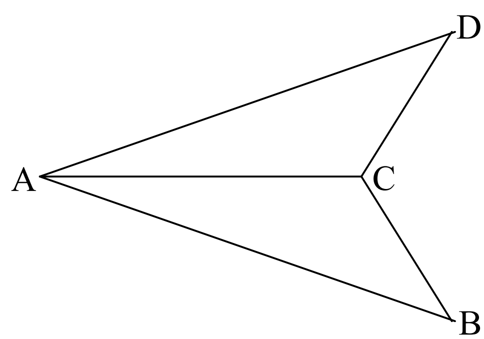

Solution: Particular enunciation: Given that, in the figure, CD is the perpendicular bisector of AB. i.e., AD = BD. We have to prove that, $\Delta ADC \cong \Delta BDC$.

Proof: In $\Delta ADC$ and $\Delta BDC$, AD = BD

CD is the common side and $\angle ADC = \angle BDC = 90^0$ [$\because CD \perp AB$]

$\therefore \Delta ADC \cong \Delta BDC$ (Proved)

Problem – 2: In the figure, CD = CB and $\angle DCA = \angle BCA$. Prove that AB = AD.




Solution: Particular enunciation: Given that, in the figure, CD = CB and $\angle DCA = \angle BCA$. We have to prove that AB = AD.

Proof: In $\Delta ABC$ and $\Delta ADC$, we get

CB = CD

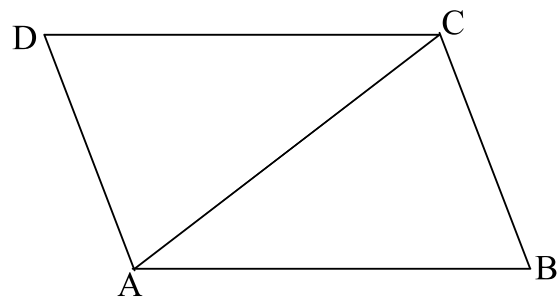
AC is the common side of both triangles,

and $\angle DCA = \angle BCA$

$\therefore \Delta ABC \cong \Delta ADC$

$\therefore$ AB = AD (Proved)

Problem – 3: In the figure, ∠BAC = ∠ACD and AB = DC. Prove that AD = BC, ∠CAD = ∠ACD and ∠ADC = ∠ABC.




Solution: Given that, in the figure, ∠BAC = ∠ACD and AB = DC. We have to prove that AD = BC, ∠CAD = ∠ACD and ∠ADC = ∠ABC.

Proof: In ΔABC and ΔADC,

AB = DC

AC is the common side

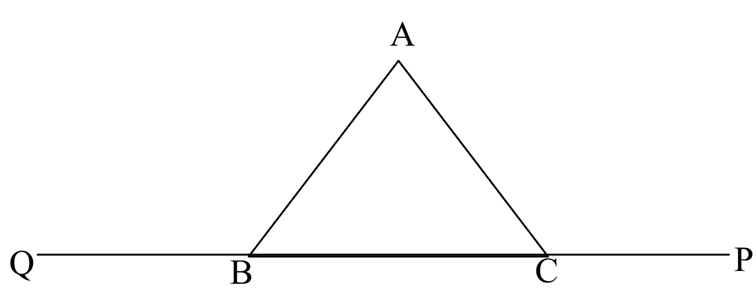
and included ∠BAC = ∠ACD

∴ΔABC ≌ ΔADC

∴ AD = BC, ∠CAD = ∠ACD and ∠ADC = ∠ABC. (Proved)

Problem – 4: If the base of an isosceles triangle is produced both ways, show that the exterior angles so formed are equal.

Solution: General enunciation: If the base of an isosceles triangle is produced both ways, show that the exterior angles so formed are equal.



Particular enunciation: Let, ∆ABC is an isosceles triangle where AB = AC and BC its base. The base BC is produced on both sides up to P and Q and exterior angles so formed are ∠ABQ and ∠ACP.

Proof: In ∆ABC

AB = AC

∴∠ACB = ∠ABC

Since ∠ABC and ∠ABQ are adjacent angles and lie on the same line,

∴ ∠ABC + ∠ABQ = $180^0$ ---------------------------- (1)

And ∠ACB + ∠ACP = $180^0$ ------------------------- (2)

From equation (1) and (2) we get,

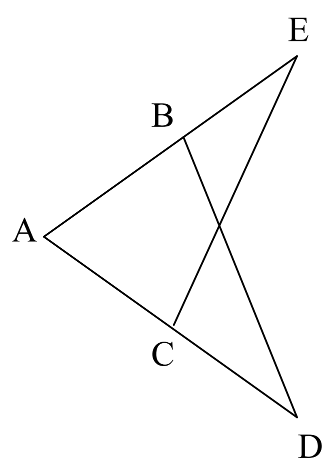
∠ABC + ∠ABQ = ∠ACB + ∠ACP

⟹ ∠ABC + ∠ABQ = ∠ABC + ∠ACP

⟹ ∠ABQ = ∠ACP [neglect ∠ABC from both side]

∴ ∠ABQ = ∠ACP. (Proved)

Problem – 5: In the figure, AD = AE, BD = CE and ∠AEC = ∠ADB. Prove that AB = AC.




Particular enunciation: In the figure, AD = AE, BD = CE and ∠AEC = ∠ADB. We have to prove that AB = AC.

Proof: In ∆ACE and ∆ADB,

AD = AE [Given]

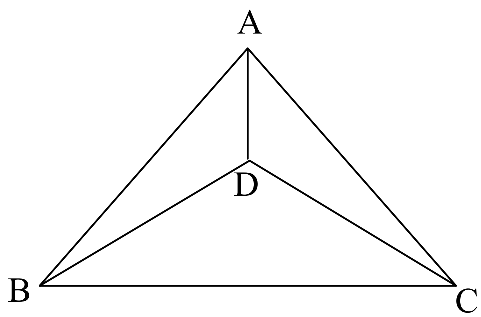
BD = CE [Given]

and ∠AEC = ∠ADB

∴ ΔACE ≅ ΔADB

Therefore, AB = AC.  (Proved)

Problem – 6: In the figure, ΔABC and ΔDBC are both isosceles triangles. Prove that, ΔABD ≅ ΔACD.




Particular enunciation: In the figure, ΔABC and ΔDBC are both isosceles triangles. We have to prove that, ΔABD ≅ ΔACD.

Proof: Given that, ΔABC is an isosceles triangle.

∴ AB = AC

And ΔDBC is an isosceles triangle.

∴ DB = DC

Now, in ΔABC and ΔACD

AB =AC

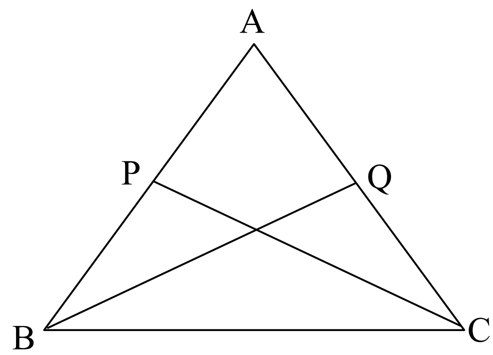
DB = DC

And AD = AD [common side]

∴ ΔABD ≅ ΔACD (Proved)

Problem – 7: Show that the medians drawn from the extremities of the base of an isosceles triangle to the opposite sides are equal to each other.

General enunciation: The medians drawn from the extremities of the base of an isosceles triangle to the opposite sides are equal to each other.




Particular enunciation: Let, ABC is an isosceles triangle where AB = AC. BQ and CP are medians drawn to the sides AC and AB respectively. We have to prove that, BQ = CP.

Proof: In ΔABC,

AB =AC

⟹ ½ AB = ½ AC [Divide both side by 2]

⟹ BP = CQ [P and Q are the mid points of AB and AC respectively]

Now in ΔBCE and ΔDCB,

BP = CQ

∴ ∠PBC = ∠QCB [∵ opposite angles of equal arms AB and AC are equal]

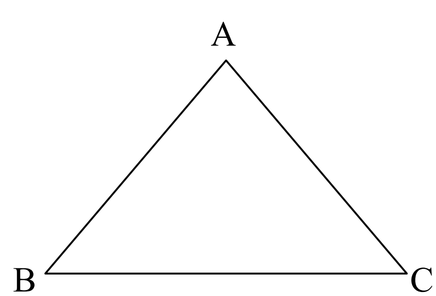
And BC is the common side.

∴ ΔBCP ≅ ΔQCB

∴ BQ = CP [proved]

Problem – 8: Prove that the angles of an equilateral triangle are equal to one another.

General enunciation: We have to prove that the angles of an equilateral triangle are equal to one another.



Particular enunciation: Let, ABC is an equilateral triangle i.e., AB = AC = BC.

We have to prove that, ∠A = ∠B = ∠C

Proof: Given that, AB =AC = BC

In ΔABC,

AB = AC

∴ ∠ACB = ∠BAC [∵opposite angles are equal arms are equal.]

⟹∠C = ∠B ---------------------------------------- (1)

Again, in ΔABC,

AC = BC

∴ ∠ABC = ∠BAC [∵opposite angles are equal arms are equal.]

⟹ ∠B = ∠A --------------------------------------- (2)

From (1) and (2) we have

∠C = ∠B = ∠A

∴ ∠A = ∠B = ∠C [proved]