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8. In right triangle ABC, right angled at C, M is the mid-point of hypotenuse AB. C is joined to M and produced to a point D such that DM = CM. Point D is joined to point B (see Fig. 7.23). Show that:

(i) ΔAMC ΔBMD

(ii) DBC is a right angle.

(iii) ΔDBC ΔACB

(iv) CM = ½ AB

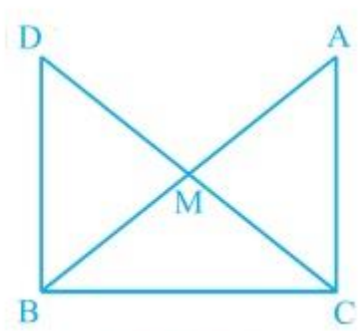


Fig. 7.23

Solution:

It is given that M is the mid-point of the line segment AB, C = 90°, and DM = CM

(i) Consider the triangles ΔAMC and ΔBMD:

AM = BM (Since M is the mid-point)

CM = DM (Given in the question)

CMA = DMB (They are vertically opposite angles)

So, by **SAS congruency criterion**, ΔAMC ΔBMD.

(ii) ACM = BDM (by CPCT)

∴ AC BD as alternate interior angles are equal.

Now, ACB +DBC = 180° (Since they are co-interiors angles)

⇒ 90° +B = 180°

∴ DBC = 90°

(iii) In ΔDBC and ΔACB,

BC = CB (Common side)

ACB = DBC (They are right angles)

DB = AC (by CPCT)

So, ΔDBC ΔACB by **SAS congruency**.

(iv) DC = AB (Since ΔDBC ΔACB)

⇒ DM = CM = AM = BM (Since M the is mid-point)

So, DM + CM = BM+AM

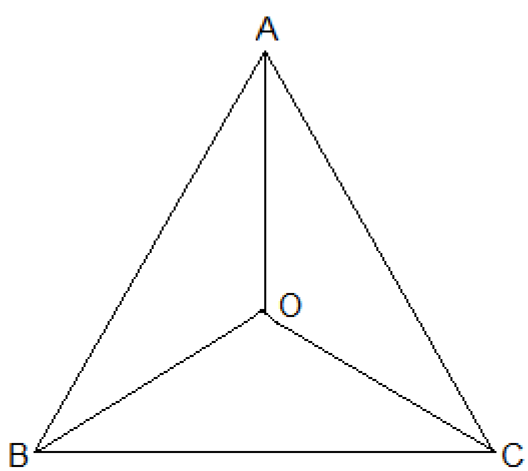
Hence, CM + CM = AB

⇒ CM = (½) AB

Exercise: 7.2 (Page No: 123)

1. In an isosceles triangle ABC, with AB = AC, the bisectors of B and C intersect each other at O. Join A to O. Show that:

(i) OB = OC (ii) AO bisects A



Solution:

Given:

AB = AC and

the bisectors of B and C intersect each other at O

(i) Since ABC is an isosceles with AB = AC,

B = C

½ B = ½ C

⇒ OBC = OCB (Angle bisectors)

∴ OB = OC (Side opposite to the equal angles are equal.)

(ii) In ΔAOB and ΔAOC,

AB = AC (Given in the question)

AO = AO (Common arm)

OB = OC (As Proved Already)

So, ΔAOB ΔAOC by SSS congruence condition.

BAO = CAO (by CPCT)

Thus, AO bisects A.

2. In ΔABC, AD is the perpendicular bisector of BC (see Fig. 7.30). Show that ΔABC is an isosceles triangle in which AB = AC.

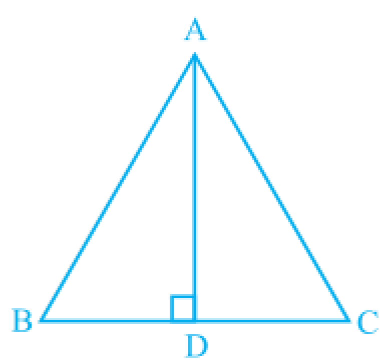


Fig. 7.30

Solution:

It is given that AD is the perpendicular bisector of BC

To prove:

AB = AC

Proof:

In ΔADB and ΔADC,

AD = AD (It is the Common arm)

ADB = ADC

BD = CD (Since AD is the perpendicular bisector)

So, ΔADB ΔADC by **SAS congruency criterion**.

Thus,

AB = AC (by CPCT)