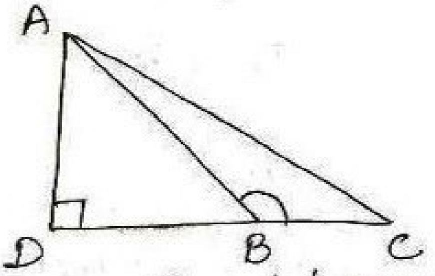
NCERT Sols by Dev Anoop (Bathinda)

Ex 6.6

③



given - In fig $\angle ABC > 90°$
$AD \perp CB$ produced

To Prove $AC^2 = AB^2 + BC^2 + 2BC.BD$

Proof In rt. $\triangle ADC$

$AC^2 = AD^2 + DC^2$ (Pythagoras th.)

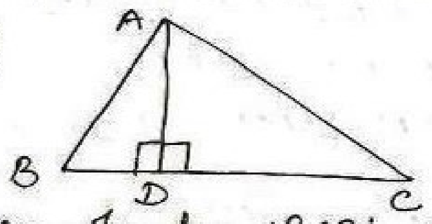
$= AD^2 + (DB + BC)^2$

$= (AD^2 + DB^2) + BC^2 + 2DB.BC$

$= AB^2 + BC^2 + 2DB.BC$ [Pythagoras theorem]

$\therefore AC^2 = AB^2 + BC^2 + 2BC.BD$

④



given - In fig. $\angle B < 90°$, $AD \perp BC$

To Prove - $AC^2 = AB^2 + BC^2 - 2BC.BD$

Proof - In rt. $\triangle ADC$

$AC^2 = AD^2 + DC^2$ (Py. th.)

$= AD^2 + (BC - BD)^2$

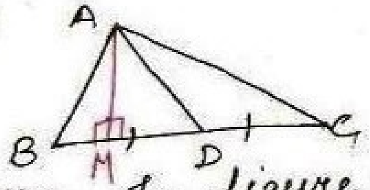
$= AD^2 + BC^2 + BD^2 - 2BC.BD$

$= AB^2 + BC^2 - 2BC.BD$

$[AD^2 + BD^2 = AB^2$ Py. th.$]$

$\therefore AC^2 = AB^2 + BC^2 - 2BC.BD$

⑤



given - In figure AD is median to BC, $AM \perp BC$

To Prove (i) $AC^2 = AD^2 + BC.DM + \left(\frac{BC}{2}\right)^2$

(ii) $AB^2 = AD^2 - BC.DM + \left(\frac{BC}{2}\right)^2$

(iii) $AC^2 + AB^2 = 2AD^2 + \frac{1}{2}BC^2$

Proof In rt $\triangle AMB$

$AB^2 = AM^2 + BM^2$ (Py. th.)

$= AM^2 + (BD - DM)^2$

$= AM^2 + BD^2 + DM^2 - 2BD.DM$

$= (AM^2 + DM^2) + BD^2 - 2BD.DM$

$= AD^2 + \left(\frac{BC}{2}\right)^2 - \cancel{2} \times \frac{BC}{\cancel{2}}.DM$

$\therefore AB^2 = AD^2 - BC.DM + \left(\frac{BC}{2}\right)^2$ ...①

In rt $\triangle AMC$

$AC^2 = AM^2 + MC^2$ (Py. th.)

$= AM^2 + (MD + DC)^2$

$= (AM^2 + MD^2) + DC^2 + 2MD.DC$

$= AD^2 + DC^2 + 2MD.DC$ [Py. th]

$= AD^2 + \left(\frac{BC}{2}\right)^2 + \cancel{2}MD.\frac{BC}{\cancel{2}}$

[$\because$ D is midpt. of BC]

$\therefore AC^2 = AD^2 + \left(\frac{BC}{2}\right)^2 + DM.BC$ ...(ii)

① + (ii)

$AC^2 + AB^2 = 2AD^2 - \cancel{BC.DM} + \cancel{DM.BC}$

$\Rightarrow AC^2 + AB^2 = 2AD^2 + \frac{BC^2}{4} + \frac{BC^2}{4}$

$\Rightarrow AC^2 + AB^2 = 2AD^2 + \frac{1}{2}BC^2$