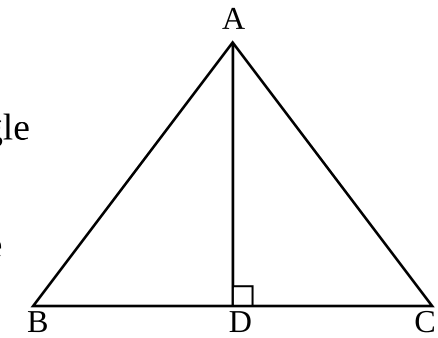
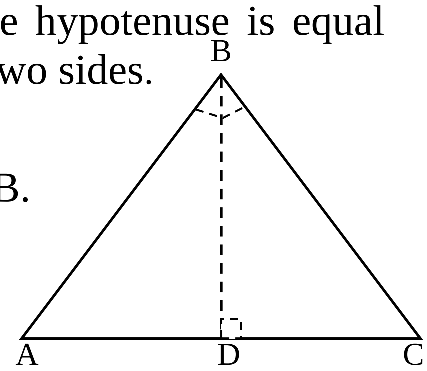
Result/Theorem 6.7 page 145 NCERT

If a perpendicular is drawn from the vertex of the right angle of a right triangle to the hypotenuse then triangles on both sides of the perpendicular are similar to the whole triangle and to each other.



Pythagoras Theorem(page 145)

Statement: In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.



Given: A right triangle ABC right angled at B.

To Prove: $AB^2 + BC^2 = AC^2$

Constructions: Draw $BD \perp AC$

Proof: Since ΔABC is a right triangle and right angle at B also $BD \perp AC$ by result.

$\Delta ADB \sim \Delta ABC$ [by theorem 6.7]

$\Rightarrow \frac{AD}{AB} = \frac{AB}{AC}$ [sides are proportional)

$\Rightarrow AB^2 = AD \times AC$ ...(i)

Similarly, $\Delta BDC \sim \Delta ABC$ [by theorem 6.7]

$\Rightarrow \frac{CD}{BC} = \frac{BC}{AC}$

$\Rightarrow BC^2 = CD \times AC$ ...(ii)

Adding (i) & (ii)

$AB^2 + BC^2 = AD \times AC + CD \times AC$

$AB^2 + BC^2 = AC \times (AD + CD)$

$AB^2 + BC^2 = AC \times AC$

$AB^2 + BC^2 = AC^2$

Hence proved.

Second proof of Pythagoras theorem.

Proof: In ΔADB and ΔABC

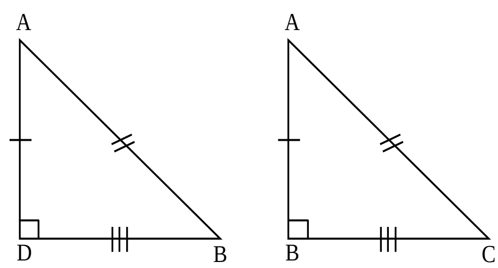
$\angle A = \angle A$ [common]

$\angle ADB = \angle ABC$ [each 90°]

$\therefore$ $\Delta ADB \sim \Delta ABC$ [by AA similarity]

$$\frac{AD}{AB} = \frac{AB}{AC} = \frac{DB}{BC}$$

$$AB^2 = AD \times AC \quad \ldots(i)$$

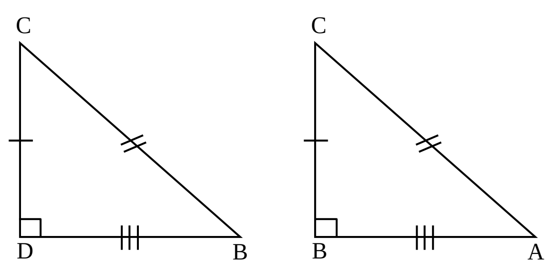


Similarly in ΔCDB and ΔCBA

$\angle C = \angle C$ [common]

$\angle CDB = \angle CBA$ [each 90°]

$\therefore$ $\Delta CDB \sim \Delta CBA$ [by AA similarity]



$$\therefore \quad \frac{CD}{CB} = \frac{CB}{CA} = \frac{DB}{BA}$$

$$CB^2 = CD \times CA \quad \ldots(ii)$$

Add (i) & (ii)

$AB^2 + CB^2 = AD \times AC + CD \times CA$

$AB^2 + BC^2 = AC(AD \times CD)$

$AB^2 + BC^2 = AC \times AC$

$AB^2 + BC^2 = AC^2$

Hence Proved.