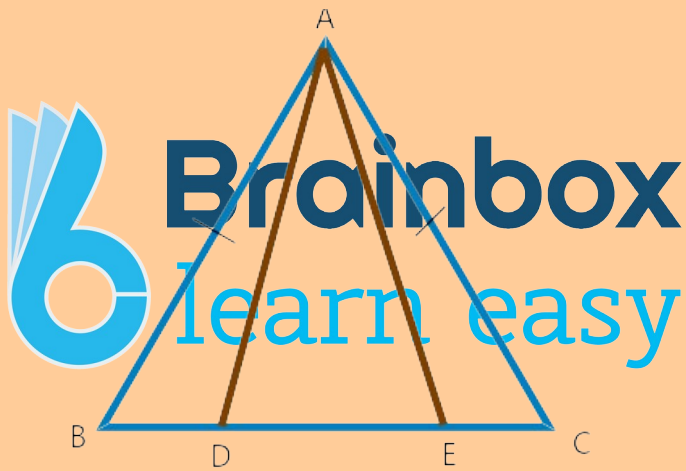
CHAPTER 06

Triangles

Solved Examples:

Example:

In an isosceles triangle ABC with AB = AC, D and E are points on BC such that BE = CD. Show that AD = AE.



Sol.

BE = CD (Given)

BE – DE = CD – DE

$\Rightarrow$ BD = CE

In ΔABD and ΔACE, we have

AB = AC (Given)

$\angle B = \angle C$ (Angles opposite to equal sides)

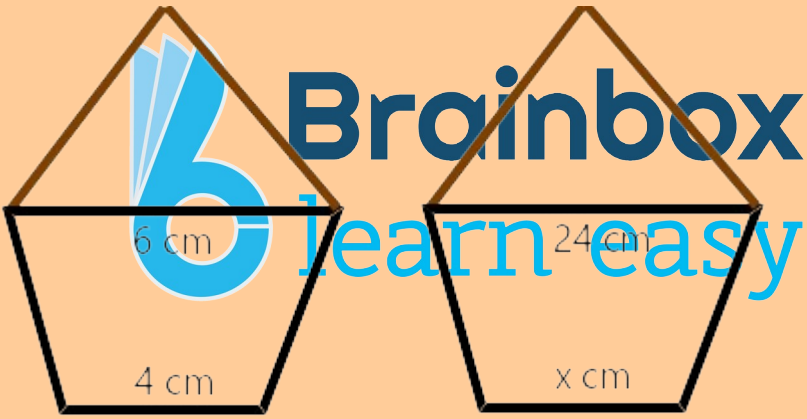
BD = CE (Proved above)

$\Delta ABD \cong \Delta ACE$ ($\because$ SAS Congruency)

$\Rightarrow$ AD = AE ($\because$ C.P.C.T)

Example:

If the given shapes are similar, then find the value of 'x'.



Sol.

Given, both figures are similar.

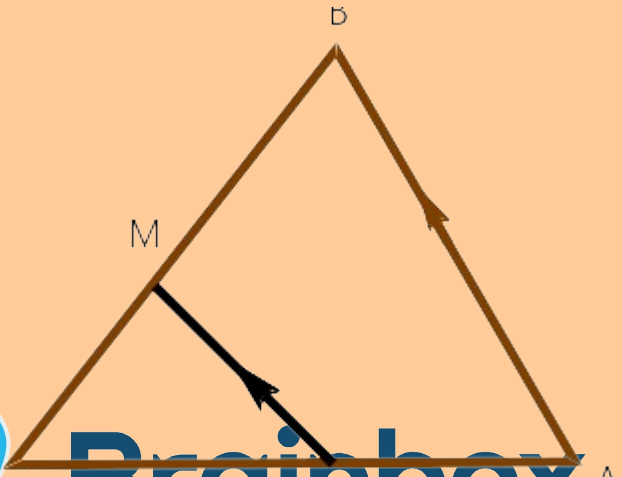
So, the ratio of corresponding sides will be equal.

$$\therefore \frac{4}{x} = \frac{6}{24} \Rightarrow x = \frac{24 \times 4}{6} = 16$$

Hence, x = 16 cm

Example:

In the given figure LM || AB, AL = x – 3, AC = 2x, BM = x – 2 and BC = 2x + 3. Find the value of 'x'.



Sol.

In ΔABC, LM || AB

$$\Rightarrow \frac{AL}{LC} = \frac{BM}{MC}$$ (By B.P.T)

$$\frac{x-3}{2x-(x-3)} = \frac{x-2}{(2x+3)-(x-2)}$$

$$\frac{x-3}{x+3} = \frac{x-2}{x+5}$$

$$(x-3)(x+5) = (x-2)(x+3)$$ (Cross multiplication)

$x^2 + 2x - 15 = x^2 + x - 6$

$2x - x = -6 + 15$

$\therefore \boxed{x = 9}$

Example:

In ΔABC, $\angle B = 90^\circ$ and 'D' is the midpoint of BC. Prove that $AC^2 = AD^2 + 3CD^2$.

Sol.

In ΔABC, D is the midpoint of BC

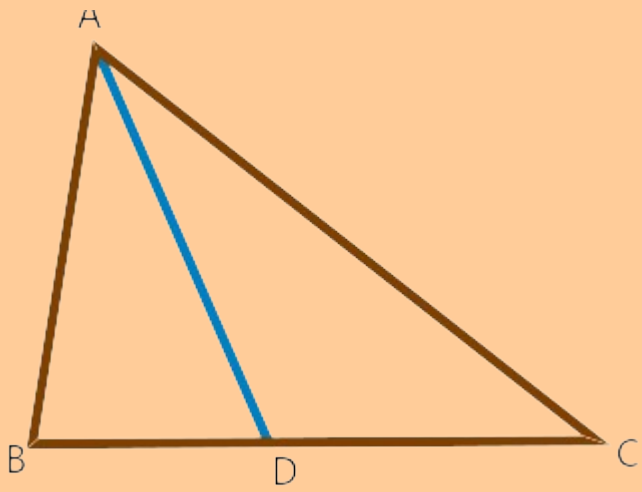
$\therefore BD = CD = \frac{1}{2} BC$ ..... (1)

Using Pythagoras theorem in ΔABC, we get

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

$\Rightarrow AC^2 = AB^2 + (2CD)^2$ (From (1))

$\Rightarrow AC^2 = AB^2 + 4CD^2$ ..... (2)



Using Pythagoras theorem in ΔABD, we get

$AD^2 = AB^2 + BD^2$

$AD^2 = AB^2 + CD^2$ (From (1) ..... (3)

Subtracting (3) from (2), we get

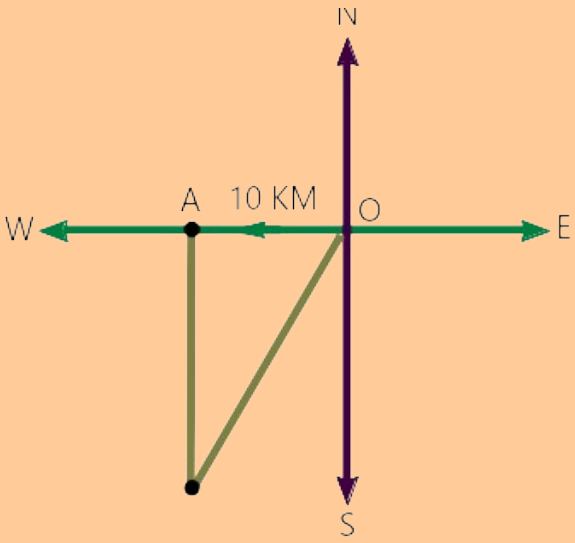
$AC^2 - AD^2 = 3CD^2$

$\Rightarrow AC^2 = AD^2 + 3CD^2$

Example:

A man goes 10 KM due west and then 30 KM due south. Find his distance from the starting point.

Sol.



Let 'O' be the starting point.

He goes OA = 10 KM due west and then,

AB = 30 KM due south.

Using Pythagoras theorem,

We get,

$OB^2 = OA^2 + AB^2$

$= 10^2 + 30^2$

$= 100 + 900$

$OB^2 = 1000$

$\Rightarrow OB = \sqrt{1000} = 10\sqrt{10} = 31.62$ KM