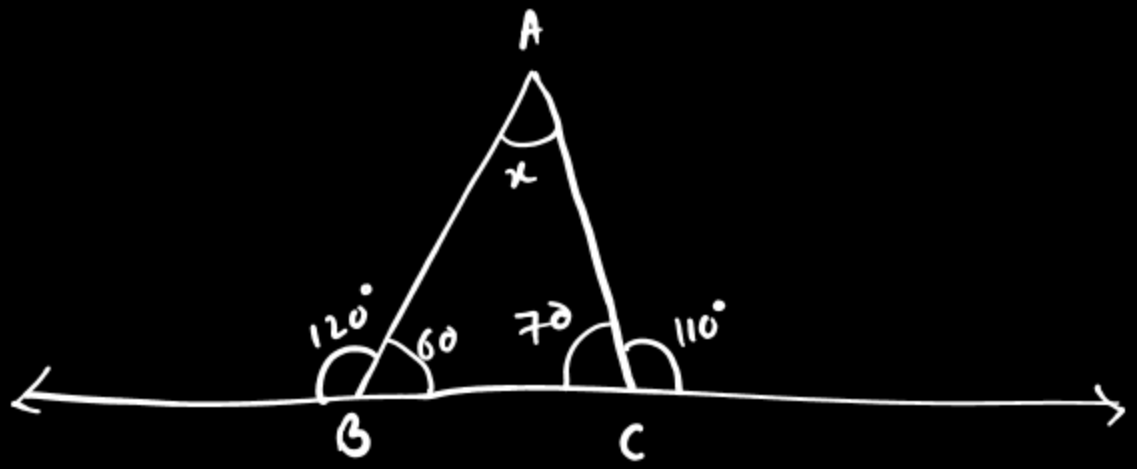
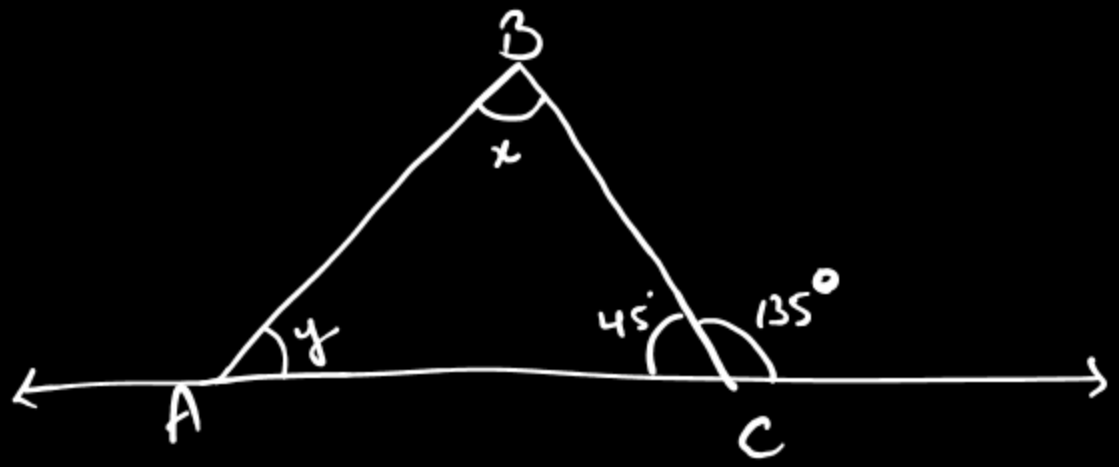
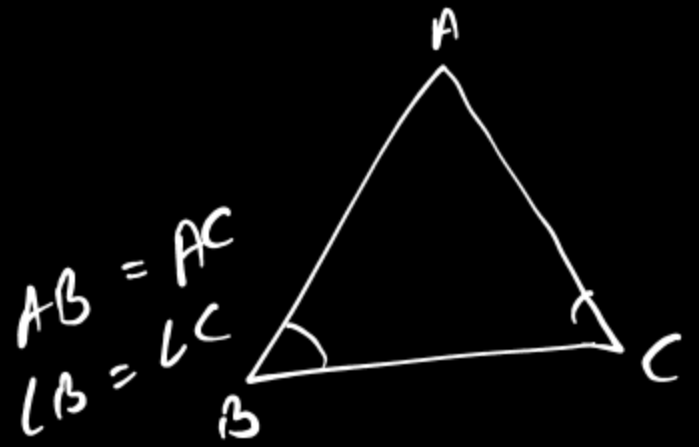
Triangles: Pythagorean Theorem

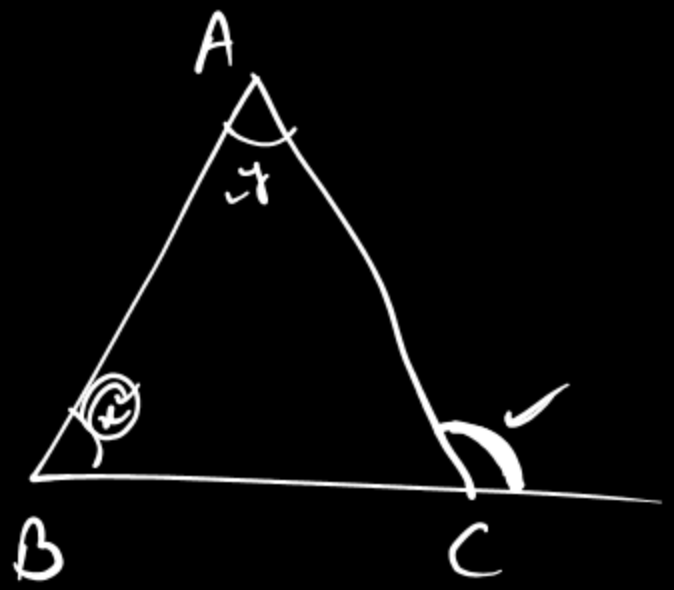
Q.



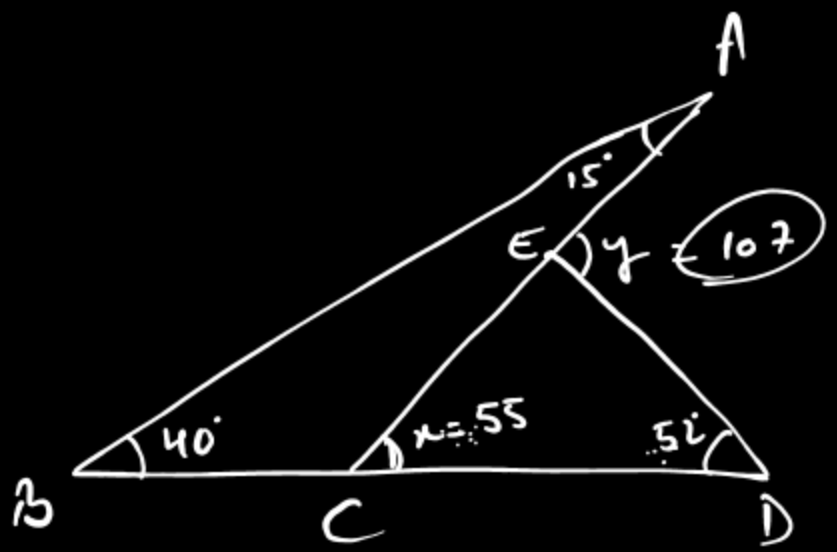


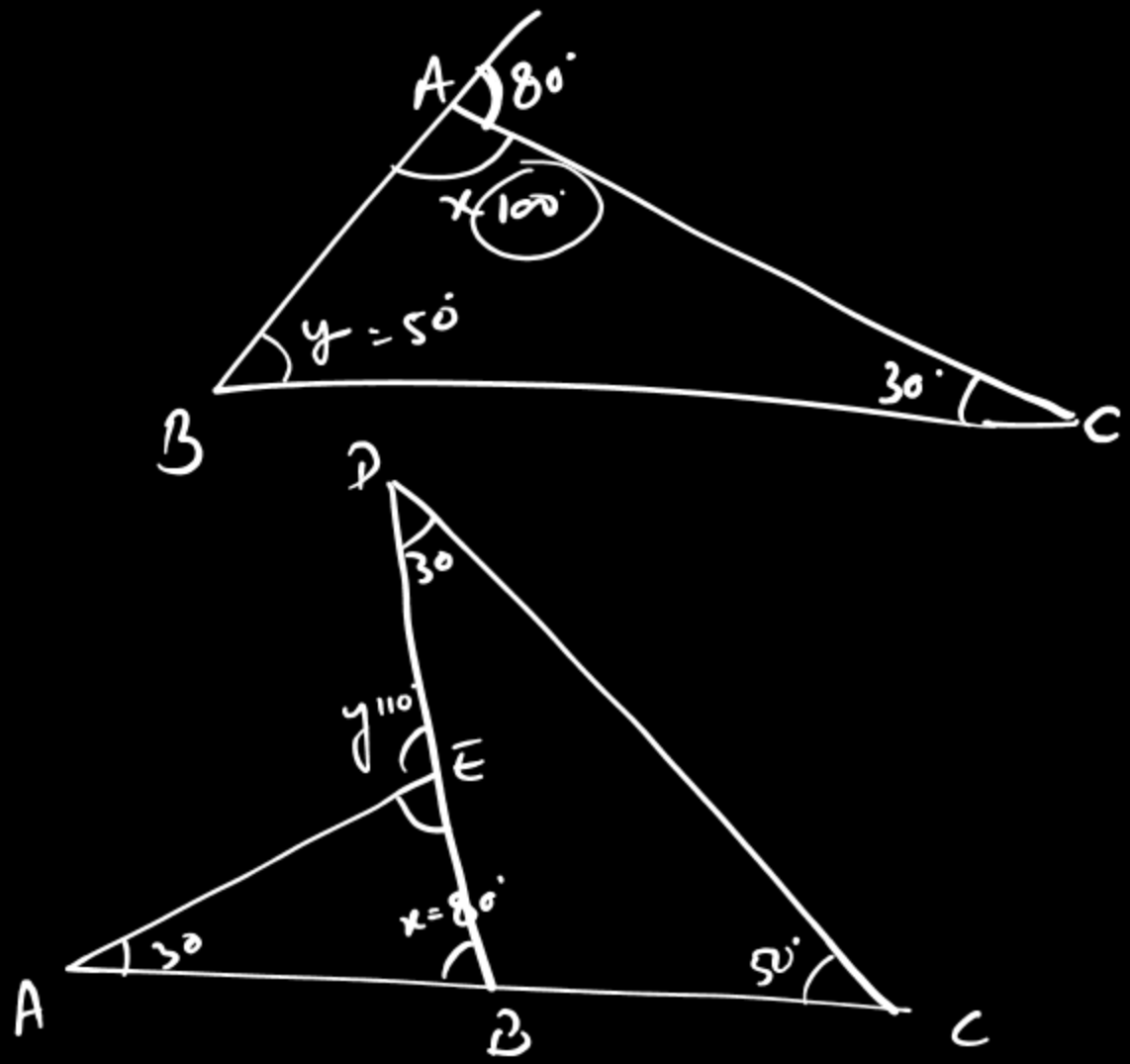
$BC = AC$





exterior angle of a triangle = sum of opposite interior angles





Pythagoras Theorem

↳ Gives a relation between lengths of sides of a right angle triangle.

AB and BC are perpendicular sides

AC ⇒ hypotenuse.

Right angle triangle

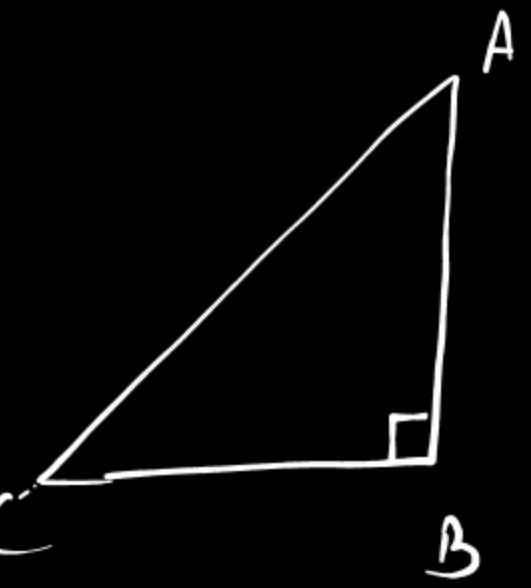
[Square of hypotenuse = Sum of square of both the perpendicular sides.

$$(AC)^2 = (AB)^2 + BC^2$$ ✓

Eg: $AB = 4$ cm.

$BC = 3$ cm.

Find ~~AC~~ length of AC.



Sol: Using ~~Pho~~ Pythagoras Theorem,

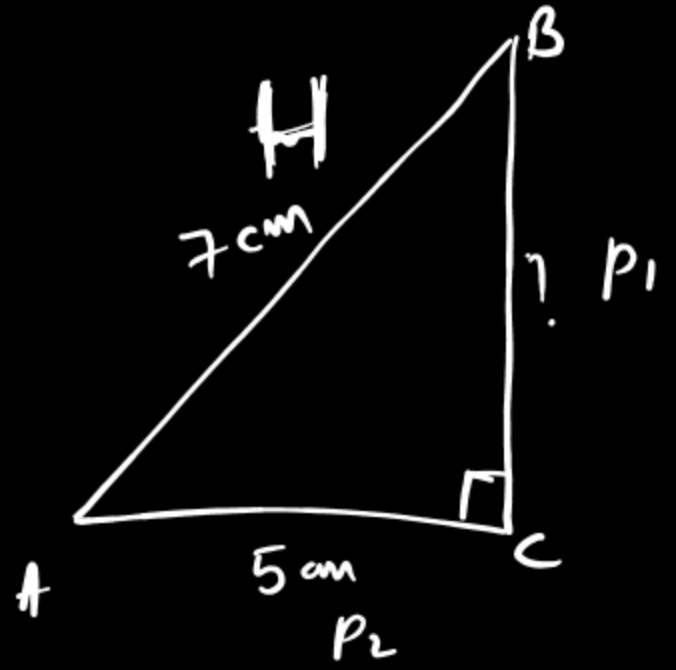
$$AC^2 = AB^2 + BC^2$$

$$AC^2 = 4^2 + 3^2$$

$$AC^2 = 16 + 9$$

$$AC^2 = 25$$

$$\boxed{AC = 5 \text{ cm}}$$



$$H^2 = P_1^2 + P_2^2$$

$H^2 = P_1^2 + P_2^2$

$P_1^2 = H^2 - P_2^2$

$= 7^2 - 5^2$

$= 49 - 25$

$AB = 7$ cm

$AC = 5$ cm

$BC = ?$

2	24
2	12
2	6
3	3
	1

$P_1^2 = 24$

$P_1 = \sqrt{24}$ cm.

$= \sqrt{2 \times 2 \times 2 \times 3}$

$= 2\sqrt{6}$ cm.

$\sqrt{2 \times 2} = 2$

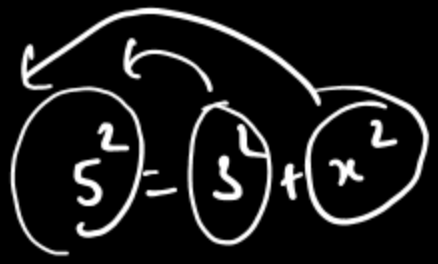
$\sqrt{2 \times 2 \times 3 \times 3 \times 5}$

$= 6\sqrt{5}$.

Pythagoras Theorem

$$(\text{hypotenuse})^2 = (\text{base})^2 + (\text{perpendicular})^2$$

'hypotenuse'



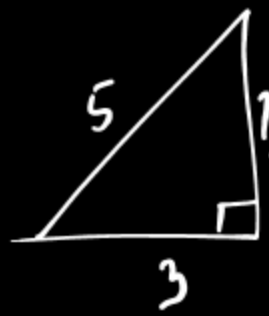
$-x^2 = -5^2 + 3^2$

$-x^2$

$-x^2$

$$5^2 - 3^2 = x^2$$

$x^2 = 25 - 9$

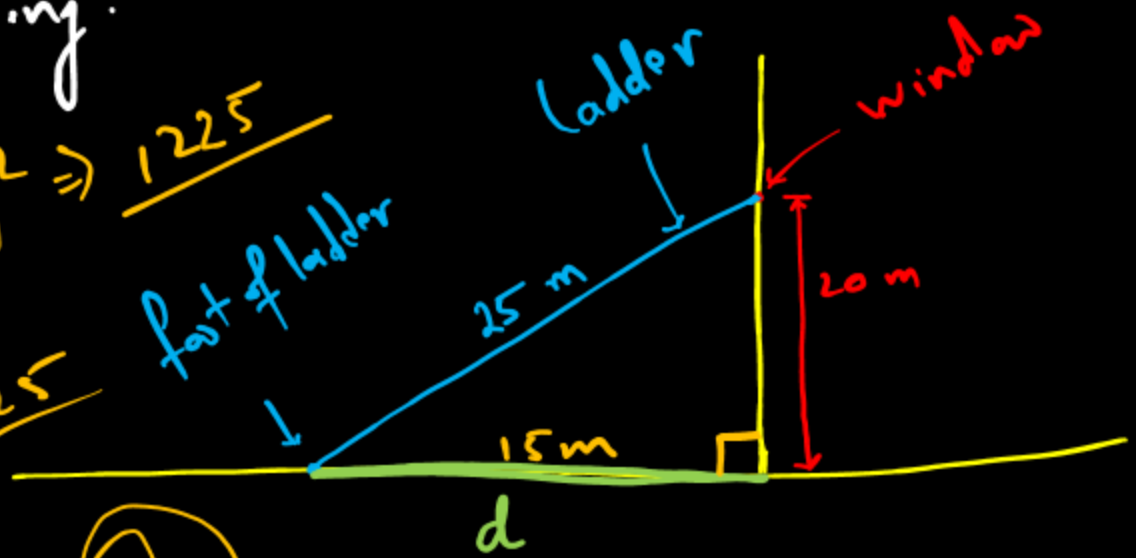


$x^2 = 16$

$x = \sqrt{16}$

$x = 4, -4$ ✗

A ladder 25 m long reaches a window of a building 20 m above the ground. Determine the distance of the foot of the ladder from the building.



$625 - 400 = 225$

$d^2 = 25^2 - 20^2$ (2×10)

$d^2 = (45)(5)$

$d^2 = 225$

$d^2 = 225$

$(75)^2 =$

$55^2 = 3025$

$(35)^2 \Rightarrow 1225$

$d = \sqrt{225}$

$= 15\text{m}$ or -15 ✗

$b(a-b)$

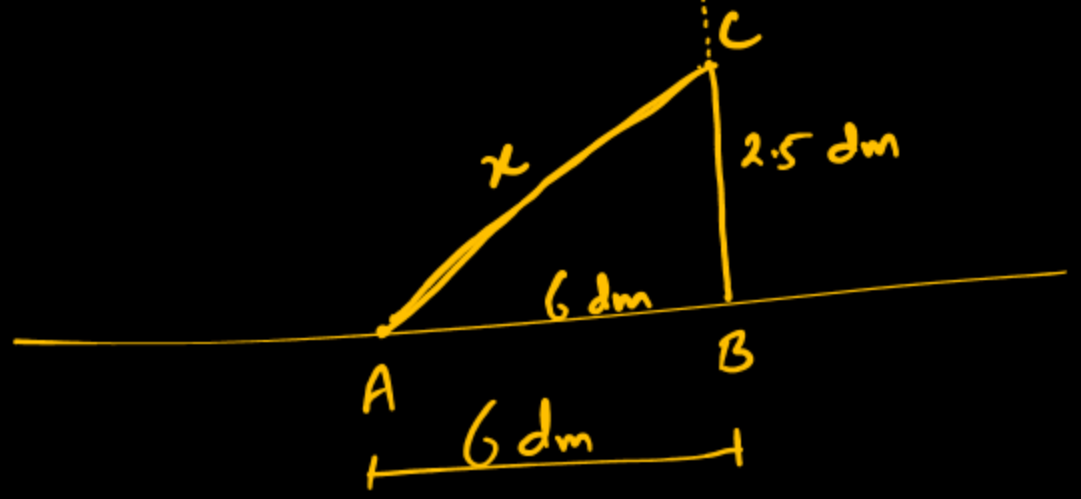
$(a+b)(a-b)$

$$a^2 - b^2 = (a+b)(a-b)$$

$(a+b)(a-b) = a^2 - ab + ab - b^2$

$= a^2 - b^2$

Q. A tree broke at a point but did not separate. Its top touched the ground at a distance of 6 dm from its base. If the point where it broke be at height 2.5 dm from the ground, what was the total height of the tree before it broke.



$x^2 = 6^2 + (2.5)^2$

$= 36 + 6.25$

$x^2 = 42.25$

$x = \sqrt{42.25}$

$x = 6.5$ dm

total height $= x + 2.5$ dm

$= 6.5 + 2.5$ dm

$= 9$ dm

End of the Chapter