

**Solutions**  
**Class 10 Maths**  
**Chapter 4**  
**Ex4.7**

1. If the sides of a triangle are 3 cm, 4 cm, and 6 cm long, determine whether the triangle is a right-angled triangle.

**Sol:**

We have,

Sides of triangle

$$AB = 3 \text{ cm}$$

$$BC = 4 \text{ cm}$$

$$AC = 6 \text{ cm}$$

$$\therefore AB^2 = 3^2 = 9$$

$$BC^2 = 4^2 = 16$$

$$AC^2 = 6^2 = 36$$

$$\text{Since, } AB^2 + BC^2 \neq AC^2$$

Then, by converse of Pythagoras theorem, triangle is not a right triangle.

2. The sides of certain triangles are given below. Determine which of them right triangles are.

(i)  $a = 7 \text{ cm}$ ,  $b = 24 \text{ cm}$  and  $c = 25 \text{ cm}$

(ii)  $a = 9 \text{ cm}$ ,  $b = 16 \text{ cm}$  and  $c = 18 \text{ cm}$

(iii)  $a = 1.6 \text{ cm}$ ,  $b = 3.8 \text{ cm}$  and  $c = 4 \text{ cm}$

(iv)  $a = 8 \text{ cm}$ ,  $b = 10 \text{ cm}$  and  $c = 6 \text{ cm}$

**Sol:**

We have,

$$\begin{aligned}
 a &= 7 \text{ cm, } b = 24 \text{ cm and } c = 25 \text{ cm} \\
 \therefore a^2 &= 49, b^2 = 576 \text{ and } c^2 = 625 \\
 \text{Since, } a^2 + b^2 &= 49 + 576 \\
 &= 625 \\
 &= c^2
 \end{aligned}$$

Then, by converse of Pythagoras theorem, given triangle is a right triangle.

We have,

$$\begin{aligned}
 a &= 9 \text{ cm, } b = 16 \text{ cm and } c = 18 \text{ cm} \\
 \therefore a^2 &= 81, b^2 = 256 \text{ and } c^2 = 324 \\
 \text{Since, } a^2 + b^2 &= 81 + 256 = 337 \\
 &\neq c^2
 \end{aligned}$$

Then, by converse of Pythagoras theorem, given triangle is not a right triangle.

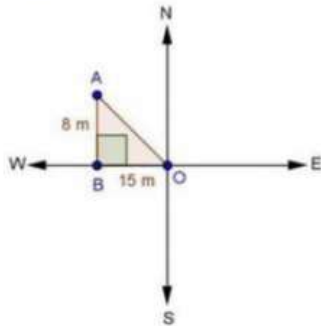
We have,

$$\begin{aligned}
 a &= 1.6 \text{ cm, } b = 3.8 \text{ cm and } c = 4 \text{ cm} \\
 \therefore a^2 &= 64, b^2 = 100 \text{ and } c^2 = 36 \\
 \text{Since, } a^2 + c^2 &= 64 + 36 = 100 = b^2
 \end{aligned}$$

Then, by converse of Pythagoras theorem, given triangle is a right triangle.

3. A man goes 15 metres due west and then 8 metres due north. How far is he from the starting point?

**Sol:**



Let the starting point of the man be O and final point be A.

$$\therefore \text{In } \triangle ABO, \text{ by Pythagoras theorem } AO^2 = AB^2 + BO^2$$

$$\Rightarrow AO^2 = 8^2 + 15^2$$

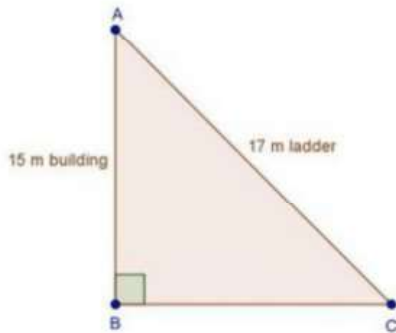
$$\Rightarrow AO^2 = 64 + 225 = 289$$

$$\Rightarrow AO = \sqrt{289} = 17m$$

$\therefore$  He is 17m far from the starting point.

4. A ladder 17 m long reaches a window of a building 15 m above the ground. Find the distance of the foot of the ladder from the building.

**Sol:**



In  $\triangle ABC$ , by Pythagoras theorem

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

$$\Rightarrow 15^2 + BC^2 = 17^2$$

$$\Rightarrow 225 + BC^2 = 289$$

$$\Rightarrow BC^2 = 289 - 225$$

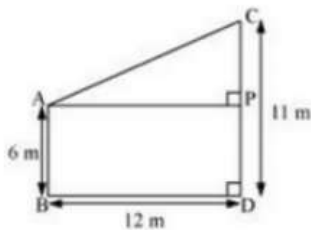
$$\Rightarrow BC^2 = 64$$

$$\Rightarrow BC = 8 \text{ m}$$

$\therefore$  Distance of the foot of the ladder from building = 8 m

5. Two poles of heights 6 m and 11 m stand on a plane ground. If the distance between their feet is 12 m, find the distance between their tops.

**Sol:**



Let CD and AB be the poles of height 11 and 6 m.

Therefore  $CP = 11 - 6 = 5 \text{ m}$

From the figure we may observe that  $AP = 12 \text{ m}$

In triangle APC, by applying Pythagoras theorem

$$AP^2 + PC^2 = AC^2$$

$$12^2 + 5^2 = AC^2$$

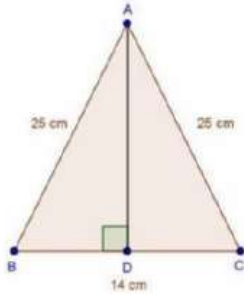
$$AC^2 = 144 + 25 = 169$$

$$AC = 13$$

Therefore distance between their tops = 13m.

6. In an isosceles triangle ABC, AB = AC = 25 cm, BC = 14 cm. Calculate the altitude from A on BC.

**Sol:**



We have

AB = AC = 25 cm and BC = 14 cm

In  $\triangle ABD$  and  $\triangle ACD$

$\angle ADB = \angle ADC$  [Each  $90^\circ$ ]

AB = AC [Each 25 cm]

AD = AD [Common]

Then,  $\triangle ABD \cong \triangle ACD$  [By RHS condition]

$\therefore BD = CD = 7$  cm [By c.p.c.t]

In  $\triangle ADB$ , by Pythagoras theorem

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

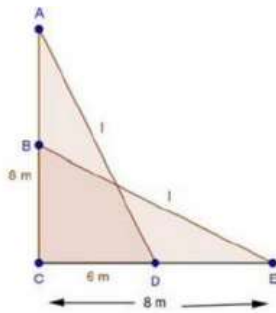
$$\Rightarrow AD^2 + 7^2 = 25^2$$

$$\Rightarrow AD^2 = 625 - 49 = 576$$

$$\Rightarrow AD = \sqrt{576} = 24 \text{ cm}$$

7. The foot of a ladder is 6 m away from a wall and its top reaches a window 8 m above the ground. If the ladder is shifted in such a way that its foot is 8 m away from the wall, to what height does its tip reach?

**Sol:**



Let, length of ladder be  $AD = BE = l$  m

In  $\triangle ACD$ , by Pythagoras theorem

$$AD^2 = AC^2 + CD^2$$

$$\Rightarrow l^2 = 8^2 + 6^2 \quad \dots(i)$$

In  $\triangle BCE$ , by pythagoras theorem

$$BE^2 = BC^2 + CE^2$$

$$\Rightarrow l^2 = BC^2 + 8^2 \quad \dots(ii)$$

Compare (i) and (ii)

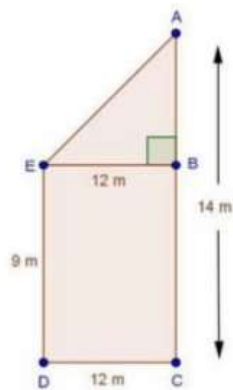
$$BC^2 + 8^2 = 8^2 + 6^2$$

$$\Rightarrow BC^2 = 6^2$$

$$\Rightarrow BC = 6 \text{ m}$$

8. Two poles of height 9 m and 14 m stand on a plane ground. If the distance between their feet is 12 m, find the distance between their tops.

**Sol:**



We have,

$AC = 14$  m,  $DC = 12$  m and  $ED = BC = 9$  m

Construction: Draw  $EB \perp AC$

$\therefore AB = AC - BC = 14 - 9 = 5$  m

And,  $EB = DC = 12$  m

In  $\triangle ABE$ , by Pythagoras theorem,

$$AE^2 = AB^2 + BE^2$$

$$\Rightarrow AE^2 = 5^2 + 12^2$$

$$\Rightarrow AE^2 = 25 + 144 = 169$$

$$\Rightarrow AE = \sqrt{169} = 13 \text{ m}$$

$\therefore$  Distance between their tops = 13 m

9. Using Pythagoras theorem determine the length of AD in terms of b and c shown in Fig. 4.219

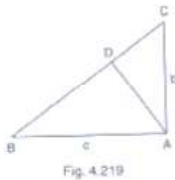


Fig. 4.219

**Sol:**

We have,

In  $\triangle BAC$ , by Pythagoras theorem

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

$$\Rightarrow BC^2 = c^2 + b^2$$

$$\Rightarrow BC = \sqrt{c^2 + b^2} \quad \dots(i)$$

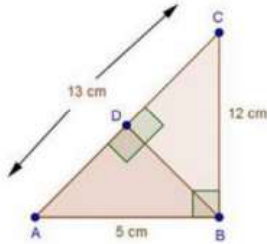
In  $\triangle ABD$  and  $\triangle CBA$

$\angle B = \angle B$  [Common]

$$\begin{aligned} \angle ADB &= \angle BAC && \text{[Each } 90^\circ\text{]} \\ \text{Then, } \triangle ABD &\sim \triangle CBA && \text{[By AA similarity]} \\ \therefore \frac{AB}{CB} &= \frac{AD}{CA} && \text{[Corresponding parts of similar } \Delta \text{ are proportional]} \\ \Rightarrow \frac{c}{\sqrt{c^2+b^2}} &= \frac{AD}{b} \\ \Rightarrow AD &= \frac{bc}{\sqrt{c^2+b^2}} \end{aligned}$$

10. A triangle has sides 5 cm, 12 cm and 13 cm. Find the length to one decimal place, of the perpendicular from the opposite vertex to the side whose length is 13 cm.

**Sol:**



Let,  $AB = 5\text{ cm}$ ,  $BC = 12\text{ cm}$  and  $AC = 13\text{ cm}$ . Then,  $AC^2 = AB^2 + BC^2$ . This proves that  $\triangle ABC$  is a right triangle, right angles at B. Let BD be the length of perpendicular from B on AC.

$$\text{Now, Area } \triangle ABC = \frac{1}{2}(BC \times BA)$$

$$= \frac{1}{2}(12 \times 5)$$

$$= 30\text{ cm}^2$$

$$\text{Also, Area of } \triangle ABC = \frac{1}{2}AC \times BD = \frac{1}{2}(13 \times BD)$$

$$\Rightarrow (13 \times BD) = 30 \times 2$$

$$\Rightarrow BD = \frac{60}{13}\text{ cm}$$