

CBSE Class –VII Mathematics

NCERT Solutions

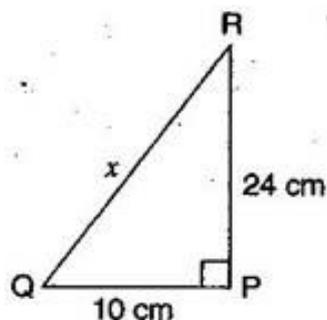
Chapter 6 The Triangle and its Properties (Ex. 6.5)

Question 1. PQR is a triangle, right angled at P. If PQ = 10 cm and PR = 24 cm, find QR.

Answer: Given: PQ = 10 cm, PR = 24 cm

Let QR be x cm.

In right angled triangle QPR,



$$(\text{Hypotenuse})^2 = (\text{Base})^2 + (\text{Perpendicular})^2$$

[By Pythagoras theorem]

$$\Rightarrow (QR)^2 = (PQ)^2 + (PR)^2$$

$$\Rightarrow x^2 = (10)^2 + (24)^2$$

$$\Rightarrow x^2 = 100 + 576 = 676$$

$$\Rightarrow x = \sqrt{676} = 26 \text{ cm}$$

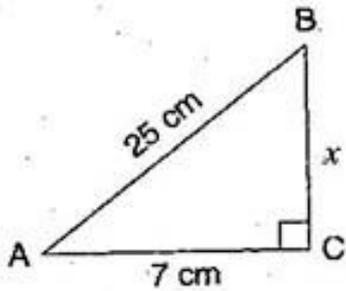
Thus, the length of QR is 26 cm.

Question 2. ABC is a triangle, right angled at C. If AB = 25 cm and AC = 7 cm, find BC.

Answer: Given: AB = 25 cm, AC = 7 cm

Let BC be x cm.

In right angled triangle ACB,



$$(\text{Hypotenuse})^2 = (\text{Base})^2 + (\text{Perpendicular})^2$$

[By Pythagoras theorem]

$$\Rightarrow (AB)^2 = (AC)^2 + (BC)^2$$

$$\Rightarrow (25)^2 = (7)^2 + x^2$$

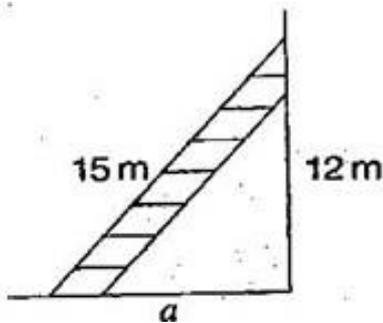
$$\Rightarrow 625 = 49 + x^2$$

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

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

Thus, the length of BC is 24 cm.

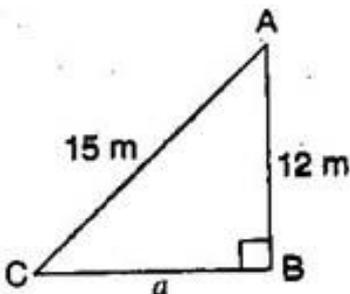
Question 3. A 15 m long ladder reached a window 12 m high from the ground on placing it against a wall at a distance a . Find the distance of the foot of the ladder from the wall.



Answer: Let AC be the ladder and A be the window.

Given: AC = 15 m, AB = 12 m, CB = a m

In right angled triangle ACB,



$$(\text{Hypotenuse})^2 = (\text{Base})^2 + (\text{Perpendicular})^2$$

[By Pythagoras theorem]

$$\Rightarrow (AC)^2 = (CB)^2 + (AB)^2$$

$$\Rightarrow (15)^2 = (a)^2 + (12)^2$$

$$\Rightarrow 225 = a^2 + 144$$

$$\Rightarrow a^2 = 225 - 144 = 81$$

$$\Rightarrow a = \sqrt{81} = 9 \text{ cm}$$

Thus, the distance of the foot of the ladder from the wall is 9 m.

Question 4. Which of the following can be the sides of a right triangle?

1. 2.5 cm, 6.5 cm, 6 cm
2. 2 cm, 2 cm, 5 cm
3. 1.5 cm, 2 cm, 2.5 cm

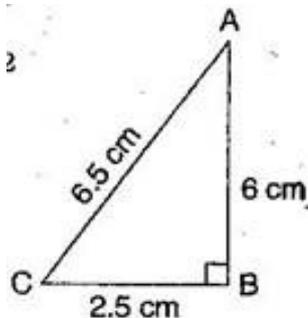
In the case of right angled triangles, identify the right angles.

Answer: Let us consider, the larger side be the hypotenuse and also using Pythagoras theorem,

$$(\text{Hypotenuse})^2 = (\text{Base})^2 + (\text{Perpendicular})^2$$

(i) 2.5 cm, 6.5 cm, 6 cm

In $\triangle ABC$, $(AC)^2 = (AB)^2 + (BC)^2$



$$\text{L.H.S.} = (6.5)^2 = 42.25 \text{ cm}$$

$$\text{R.H.S.} = (6)^2 + (2.5)^2 = 36 + 6.25 = 42.25 \text{ cm}$$

Since, L.H.S. = R.H.S.

Therefore, the given sides are of the right angled triangle.

Right angle lies on the opposite to the greater side 6.5 cm, i.e., at B.

(ii) 2 cm, 2 cm, 5 cm

$$(5)^2 = (2)^2 + (2)^2$$

$$\text{L.H.S.} = (5)^2 = 25$$

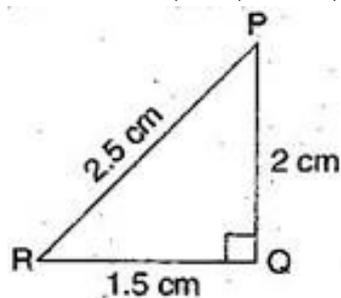
$$\text{R.H.S.} = (2)^2 + (2)^2 = 4 + 4 = 8$$

Since, L.H.S. \neq R.H.S.

Therefore, the given sides are not of the right angled triangle.

(iii) 1.5 cm, 2 cm, 2.5 cm

$$\text{In } \triangle PQR, (PR)^2 = (PQ)^2 + (RQ)^2$$



$$\text{L.H.S.} = (2.5)^2 = 6.25 \text{ cm}$$

$$\text{R.H.S.} = (1.5)^2 + (2)^2 = 2.25 + 4 = 6.25 \text{ cm}$$

Since, L.H.S. = R.H.S.

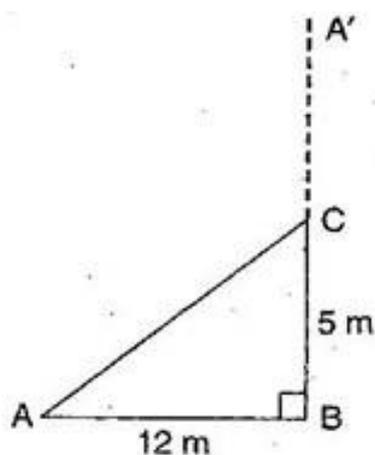
Therefore, the given sides are of the right angled triangle.

Right angle lies on the opposite to the greater side 2.5 cm, i.e., at Q.

Question 5. A tree is broken at a height of 5 m from the ground and its top touches the ground at a distance of 12 m from the base of the tree. Find the original height of the tree.

Answer: Let ACB represents the tree before it broken at the point C and let the top A' touches the ground at A after it broke. Then $\triangle ABC$ is a right angled triangle, right angled at B.

AB = 12 m and BC = 5 m



Using Pythagoras theorem, In $\triangle ABC$

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

$$\Rightarrow (AC)^2 = (12)^2 + (5)^2$$

$$\Rightarrow (AC)^2 = 144 + 25$$

$$\Rightarrow (AC)^2 = 169$$

$$\Rightarrow AC = 13 \text{ m}$$

Hence, the total height of the tree = $AC + CB = 13 + 5 = 18 \text{ m}$.

Question 6. Angles Q and R of a $\triangle PQR$ are 25° and 65° .

Write which of the following is true:

1. $PQ^2 + QR^2 = RP^2$
2. $PQ^2 + RP^2 = QR^2$
3. $RP^2 + QR^2 = PQ^2$

$25^\circ, 65^\circ$

Answer: In $\triangle PQR$,

$$\angle PQR + \angle QRP + \angle RPQ = 180^\circ$$

[By Angle sum property of a \triangle]

$$\Rightarrow 25^\circ + 65^\circ + \angle RPQ = 180^\circ$$

$$\Rightarrow 90^\circ + \angle RPQ = 180^\circ$$

$$\Rightarrow \angle RPQ = 180^\circ - 90^\circ = 90^\circ$$

Thus, ΔPQR is a right angled triangle, right angled at P.

\therefore (Hypotenuse)² = (Base)² + (Perpendicular)² [By Pythagoras theorem]

$$\Rightarrow (QR)^2 = (PR)^2 + (QP)^2$$

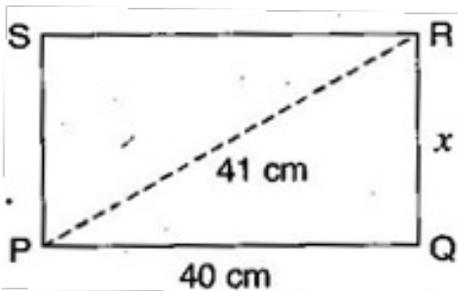
Hence, Option (ii) is correct.

Question 7. Find the perimeter of the rectangle whose length is 40 cm and a diagonal is 41 cm.

Answer: Given diagonal (PR) = 41 cm, length (PQ) = 40 cm

Let breadth (QR) be x cm.

Now, in right angled triangle PQR,



$$(PR)^2 = (RQ)^2 + (PQ)^2$$

[By Pythagoras theorem]

$$\Rightarrow (41)^2 = x^2 + (40)^2$$

$$\Rightarrow 1681 = x^2 + 1600 \Rightarrow x^2 = 1681 - 1600$$

$$\Rightarrow x^2 = 81 \Rightarrow x = \sqrt{81} = 9 \text{ cm}$$

Therefore the breadth of the rectangle is 9 cm.

Perimeter of rectangle = 2(length + breadth)

$$= 2 (9 + 40)$$

$$= 2 \times 49 = 98 \text{ cm}$$

Hence, the perimeter of the rectangle is 98 cm.

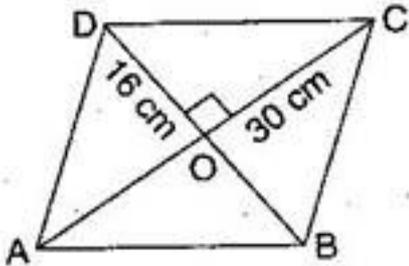
Question 8. The diagonals of a rhombus measure 16 cm and 30 cm. Find its perimeter.

Answer: Given: Diagonals AC = 30 cm and DB = 16 cm.

Since the diagonals of the rhombus bisect at right angle to each other.

$$\text{Therefore, } OD = \frac{DB}{2} = \frac{16}{2} = 8 \text{ cm}$$

$$\text{And } OC = \frac{AC}{2} = \frac{30}{2} = 15 \text{ cm}$$



Now, In right angle triangle DOC,

$$(DC)^2 = (OD)^2 + (OC)^2 \text{ [By Pythagoras theorem]}$$

$$\Rightarrow (DC)^2 = (8)^2 + (15)^2$$

$$\Rightarrow (DC)^2 = 64 + 225 = 289$$

$$\Rightarrow DC = \sqrt{289} = 17 \text{ cm}$$

Perimeter of rhombus = 4 x side

$$= 4 \times 17 = 68 \text{ cm}$$

Thus, the perimeter of rhombus is 68 cm.