CLASS 10 · MATHEMATICS · CHAPTER 9

Some Applications of Trigonometry - NCERT Examples

Examples 1-7 with independently verified solutions.

CHAPTER	RESOURCE	SOURCE
Some Applications of Trigonometry	NCERT Examples	NCERT Mathematics, Reprint 2026-27

PART 1

Verified NCERT questions and solutions

Verified NCERT questions and solutions

Solutions are checked independently and follow the supplied NCERT chapter edition.

NCERT EXAMPLE

Example 1

angle of elevation · tower height

A tower stands vertically on the ground. From a point 15 m away from the foot of the tower, the angle of elevation of its top is 60°. Find the height of the tower.

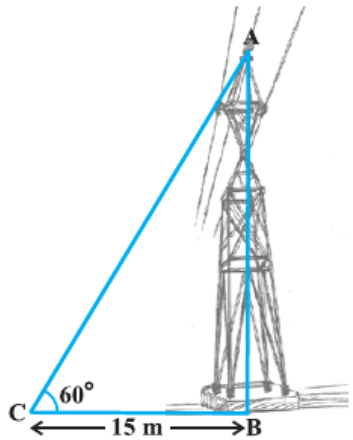


Fig. 9.4

Figure 9-4 from the supplied NCERT chapter.

Solution

Board-exam working:

Let AB be the height of the tower and BC = 15 m.

$$\tan 60^\circ = \frac{AB}{BC}$$

$$\sqrt{3} = \frac{AB}{15}$$

$$AB = 15\sqrt{3}\ \text{m}$$

Final answer

The height of the tower is 15√3 m.

NCERT EXAMPLE

Example 2

ladder · angle of elevation

An electrician has to repair an electric fault on a pole of height 5 m. She needs to reach a point 1.3 m below the top. What length of ladder, inclined at 60° to the horizontal, is required? How far from the foot of the pole should the ladder be placed? Take √3 = 1.73.

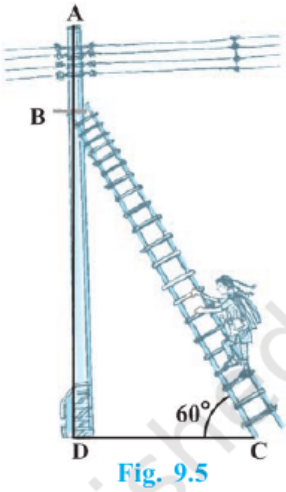


Fig. 9.5

Figure 9-5 from the supplied NCERT chapter.

Solution

Board-exam working:

The height reached on the pole is:

$$BD = 5 - 1.3 = 3.7 \text{ m}$$

Let BC be the ladder.

$$\sin 60^\circ = \frac{BD}{BC}$$

$$\frac{\sqrt{3}}{2} = \frac{3.7}{BC}$$

$$BC = \frac{3.7 \times 2}{\sqrt{3}} = \frac{7.4}{1.73} \approx 4.28 \text{ m}$$

Let DC be the distance of the ladder from the pole.

$$\tan 60^\circ = \frac{BD}{DC}$$

$$\sqrt{3} = \frac{3.7}{DC}$$

$$DC = \frac{3.7}{1.73} \approx 2.14 \text{ m}$$

Final answer

Required ladder length ≈ 4.28 m; distance from the pole ≈ 2.14 m.

NCERT EXAMPLE

Example 3

observer height · chimney

An observer 1.5 m tall is 28.5 m away from a chimney. The angle of elevation of the top of the chimney from her eyes is 45°. Find the height of the chimney.

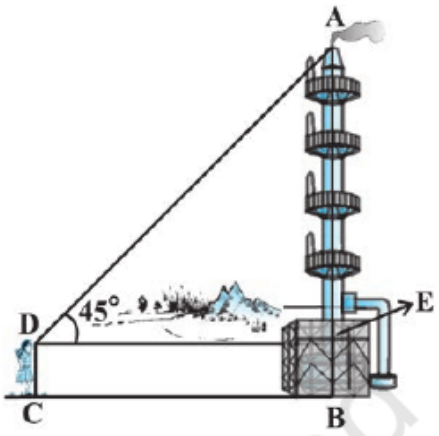


Fig. 9.6

Figure 9-6 from the supplied NCERT chapter.

Solution

Board-exam working:

Let AE be the part of the chimney above the observer's eye level.

$$DE = CB = 28.5 \text{ m}$$

$$\tan 45^\circ = \frac{AE}{DE}$$

$$1 = \frac{AE}{28.5}$$

$$AE = 28.5 \text{ m}$$

$$AB = AE + EB = 28.5 + 1.5 = 30 \text{ m}$$

Final answer

The chimney is 30 m high.

NCERT EXAMPLE

Example 4

flagstaff · two angles of elevation

From a point P on the ground, the angle of elevation of the top of a 10 m building is 30°. A flag is hoisted at the top and the angle of elevation of the top of the flagstaff is 45°. Find the flagstaff length and the distance of the building from P. Take √3 = 1.732.

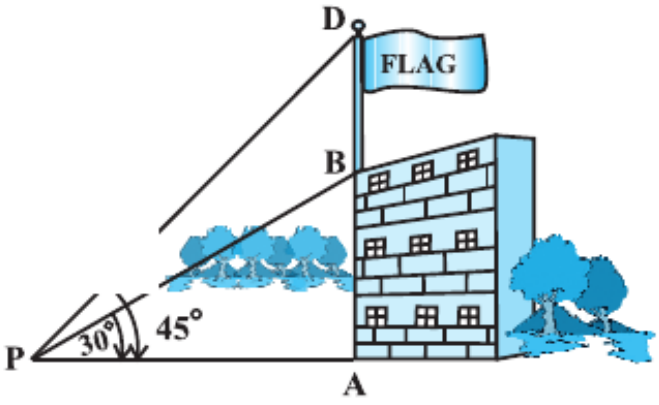


Fig. 9.7

Figure 9-7 from the supplied NCERT chapter.

Solution

Board-exam working:

Let PA be the distance from P to the building.

$$\tan 30^\circ = \frac{AB}{PA}$$

$$\frac{1}{\sqrt{3}} = \frac{10}{PA}$$

$$PA = 10\sqrt{3} = 17.32\ \text{m}$$

Let DB = x m be the flagstaff length. Then AD = 10 + x.

$$\tan 45^\circ = \frac{AD}{PA}$$

$$1 = \frac{10 + x}{10\sqrt{3}}$$

$$10 + x = 10\sqrt{3}$$

$$x = 10(\sqrt{3} - 1) = 7.32\ \text{m}$$

Final answer

The flagstaff is 7.32 m long and the building is 17.32 m from P.

NCERT EXAMPLE

Example 5

shadows · altitude of sun

The shadow of a tower is 40 m longer when the Sun's altitude is 30° than when it is 60°. Find the height of the tower.

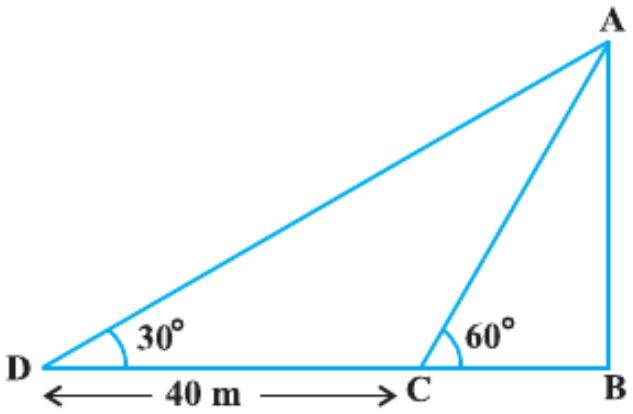


Fig. 9.8

Figure 9-8 from the supplied NCERT chapter.

Solution

Board-exam working:

Let AB = h m and BC = x m. Then BD = x + 40 m.

Using triangle ABC:

$$\tan 60^\circ = \frac{AB}{BC}$$

$$\sqrt{3} = \frac{h}{x}$$

$$h = x\sqrt{3} \qquad (1)$$

Using triangle ABD:

$$\tan 30^\circ = \frac{AB}{BD}$$

$$\frac{1}{\sqrt{3}} = \frac{h}{x+40}$$

$$h = \frac{x+40}{\sqrt{3}} \qquad (2)$$

Equating (1) and (2):

$$x\sqrt{3} = \frac{x + 40}{\sqrt{3}}$$

$$3x = x + 40$$

$$x = 20$$

$$h = 20\sqrt{3}\ \text{m}$$

Final answer

The height of the tower is 20√3 m.

NCERT EXAMPLE

Example 6

angles of depression · two buildings

The angles of depression of the top and bottom of an 8 m building from the top of a multi-storeyed building are 30° and 45°, respectively. Find the height of the multi-storeyed building and the distance between the buildings.

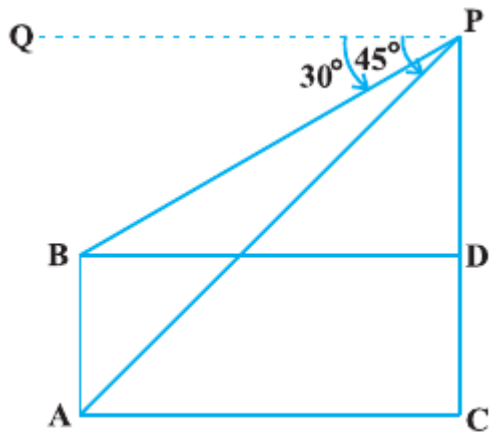


Fig. 9.9

Figure 9-9 from the supplied NCERT chapter.

Solution

Board-exam working:

Let PD = x m. Since AB = DC = 8 m, the total height PC = x + 8 m.

In triangle PBD:

$$\tan 30^\circ = \frac{PD}{BD}$$

$$\frac{1}{\sqrt{3}} = \frac{x}{BD}$$

$$BD = x\sqrt{3} \qquad (1)$$

In triangle PAC:

$$\tan 45^\circ = \frac{PC}{AC} = 1$$

$$AC = PC = x + 8 \qquad (2)$$

The distance between the buildings is the same, so AC = BD.

$$x + 8 = x\sqrt{3}$$

$$x(\sqrt{3} - 1) = 8$$

$$x = \frac{8}{\sqrt{3} - 1} = 4(\sqrt{3} + 1)$$

$$PC = x + 8 = 4(\sqrt{3} + 3)\ \text{m}$$

$$AC = 4(\sqrt{3} + 3)\ \text{m}$$

Final answer

Height of the multi-storeyed building = 4(√3 + 3) m; distance between the buildings = 4(√3 + 3) m.

NCERT EXAMPLE

Example 7

bridge · angles of depression

From a point on a bridge across a river, the angles of depression of the opposite banks are 30° and 45°. If the bridge is 3 m above the banks, find the width of the river.

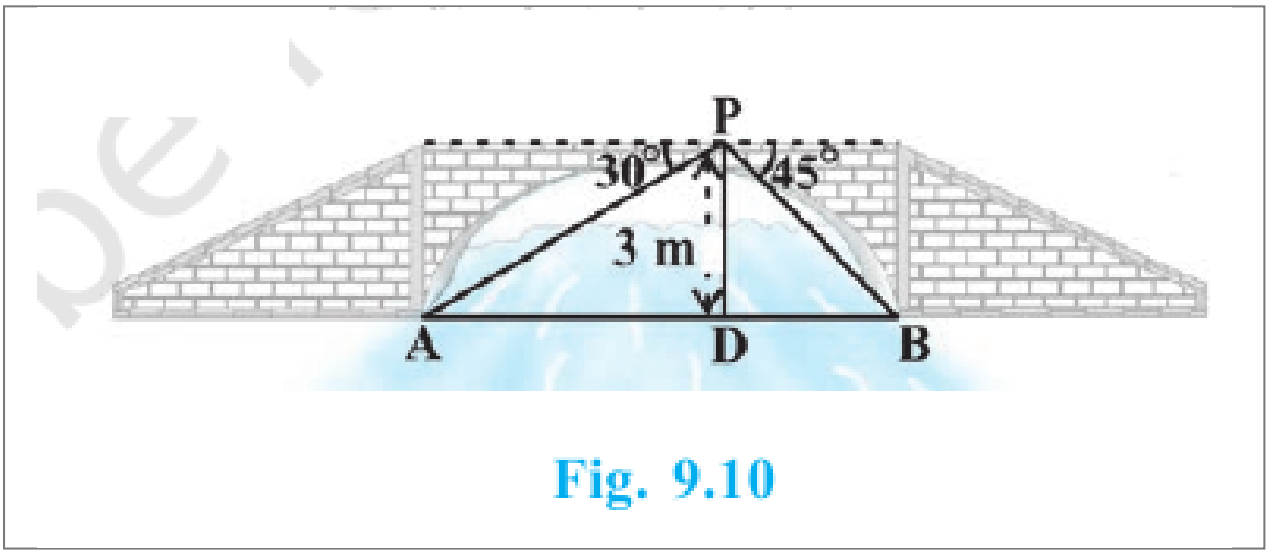


Fig. 9.10

Figure 9-10 from the supplied NCERT chapter.

Solution

Board-exam working:

Let P be the observation point and PD = 3 m. The river width is AB = AD + DB.

In triangle APD:

$$\tan 30^\circ = \frac{PD}{AD}$$

$$\frac{1}{\sqrt{3}} = \frac{3}{AD}$$

$$AD = 3\sqrt{3}\,\text{m}$$

In triangle PBD:

$$\tan 45^\circ = \frac{PD}{DB}$$

$$1 = \frac{3}{DB}$$

$$DB = 3\,\text{m}$$

$$AB = AD + DB = 3\sqrt{3} + 3 = 3(\sqrt{3} + 1)\,\text{m}$$

Final answer

The river is 3(√3 + 1) m wide.