

## Aptitude :: Height and Distance

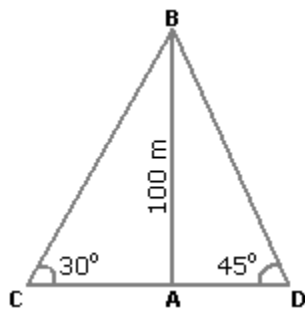
**Ques1:** Two ships are sailing in the sea on the two sides of a lighthouse. The angle of elevation of the top of the lighthouse is observed from the ships are  $30^\circ$  and  $45^\circ$  respectively. If the lighthouse is 100 m high, the distance between the two ships is:

- A. 173 m
- B. 200 m
- C. 273 m
- D. 300 m

**Answer: Option C**

**Explanation:**

Let AB be the lighthouse and C and D be the positions of the ships.



Then,  $AB = 100$  m,  $\angle ACB = 30^\circ$  and  $\angle ADB = 45^\circ$ .

$$\frac{AB}{AC} = \tan 30^\circ = \frac{1}{3} \Rightarrow AC = AB \times 3 = 100 \times 3 = 1003 \text{ m.}$$

$$\frac{AB}{AD} = \tan 45^\circ = 1 \Rightarrow AD = AB = 100 \text{ m.}$$

$$\begin{aligned} \therefore CD &= (AC + AD) = (1003 + 100) \text{ m} \\ &= 100(3 + 1) \\ &= (100 \times 2.73) \text{ m} \\ &= 273 \text{ m.} \end{aligned}$$

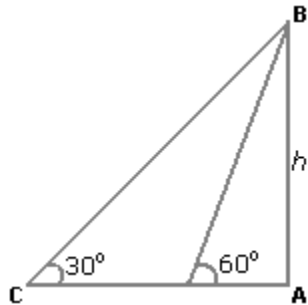
**Ques2:** A man standing at a point P is watching the top of a tower, which makes an angle of elevation of  $30^\circ$  with the man's eye. The man walks some distance towards the tower to watch its top and the angle of the elevation becomes  $60^\circ$ . What is the distance between the base of the tower and the point P?

- A. 43 units
- B. 8 units
- C. 12 units
- D. Data inadequate
- E. None of these

**Answer: Option D**

**Explanation:**

One of AB, AD and CD must have given.



So, the data is inadequate.

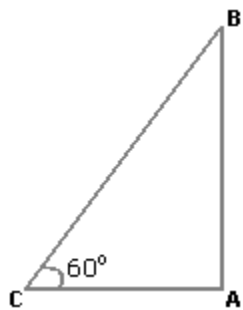
**Ques3:** The angle of elevation of a ladder leaning against a wall is  $60^\circ$  and the foot of the ladder is 4.6 m away from the wall. The length of the ladder is:

- A. 2.3 m
- B. 4.6 m
- C. 7.8 m
- D. 9.2 m

**Answer: Option D**

**Explanation:**

Let AB be the wall and BC be the ladder.



Then,  $\angle ACB = 60^\circ$  and  $AC = 4.6$  m.

$$\frac{AC}{BC} = \cos 60^\circ = \frac{1}{2}$$

$$\Rightarrow BC = 2 \times AC$$

$$= (2 \times 4.6) \text{ m}$$

$$= 9.2 \text{ m.}$$

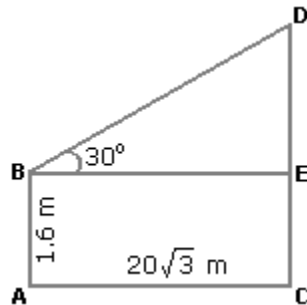
**Ques4:** An observer 1.6 m tall is 203 away from a tower. The angle of elevation from his eye to the top of the tower is  $30^\circ$ . The height of the tower is:

- A. 21.6 m
- B. 23.2 m
- C. 24.72 m
- D. None of these

**Answer: Option A**

**Explanation:**

Let AB be the observer and CD be the tower.



Draw  $BE \perp CD$ .

Then,  $CE = AB = 1.6$  m,

$BE = AC = 203$  m.

$$\frac{DE}{BE} = \tan 30^\circ = \frac{1}{3}$$

$$\Rightarrow DE = \frac{203}{3} \text{ m} = 20 \text{ m.}$$

$$\therefore CD = CE + DE = (1.6 + 20) \text{ m} = 21.6 \text{ m.}$$

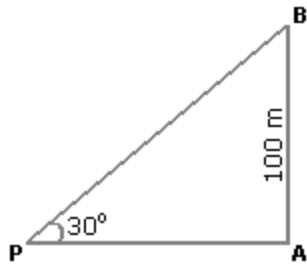
**Ques5:** From a point P on a level ground, the angle of elevation of the top tower is  $30^\circ$ . If the tower is 100 m high, the distance of point P from the foot of the tower is:

- A. 149 m
- B. 156 m
- C. 173 m
- D. 200 m

**Answer: Option C**

**Explanation:**

Let AB be the tower.



Then,  $\angle APB = 30^\circ$  and  $AB = 100$  m.

$$\frac{AB}{AP} = \tan 30^\circ = \frac{1}{3}$$

$$\Rightarrow AP = (AB \times 3) \text{ m}$$

$$= 100 \times 3 \text{ m}$$

$$= (100 \times 1.73) \text{ m}$$

$$= 173 \text{ m.}$$

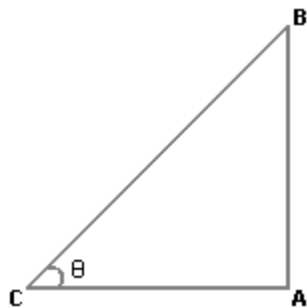
**Ques6:** The angle of elevation of the sun, when the length of the shadow of a tree 3 times the height of the tree, is:

- A.  $30^\circ$
- B.  $45^\circ$
- C.  $60^\circ$
- D.  $90^\circ$

**Answer: Option A**

**Explanation:**

Let  $AB$  be the tree and  $AC$  be its shadow.



Let  $\angle ACB = \theta$ .

$$\text{Then, } \frac{AC}{AB} = 3 \Rightarrow \cot \theta = 3$$

$$\therefore \theta = 30^\circ.$$

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