APPLICATIONS OF TRIGONOMETRY

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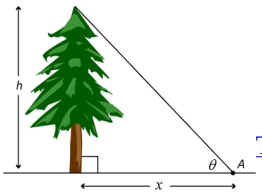
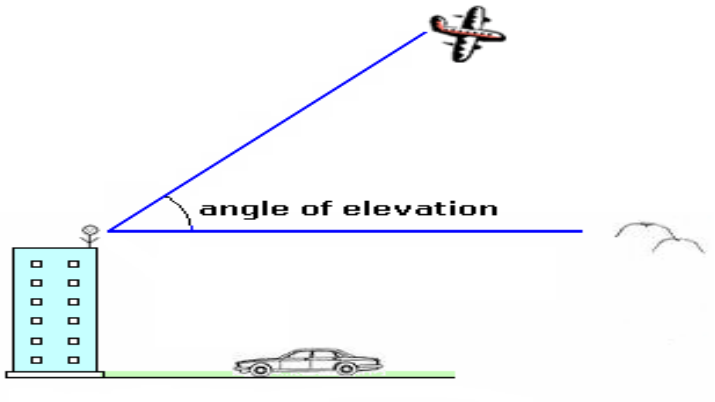
Heights and Distances



Trigonometry is used for finding the heights and distances of various objects, without actually measuring them.

We first discuss few terms which are of great use:

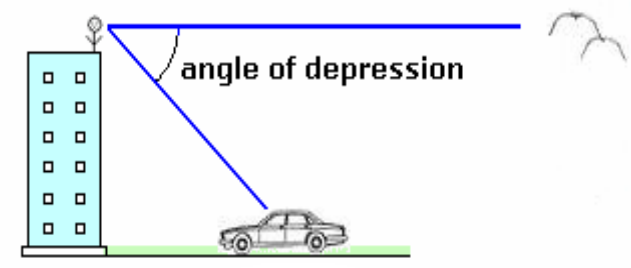


Angle of Elevation

Angle of elevation is the angle between the horizontal and the line of sight to an object above the horizontal.
In the adjoining figure, an observer is standing at the top of a building and looking straight ahead at the birds (horizontal line). The observer must raise his eyes to see the airplane (slanting line).

The angle formed between the two lines is called the angle of elevation.

Angle of Depression



Angle of depression is the angle between the horizontal and the

line of sight to an object beneath the horizontal.

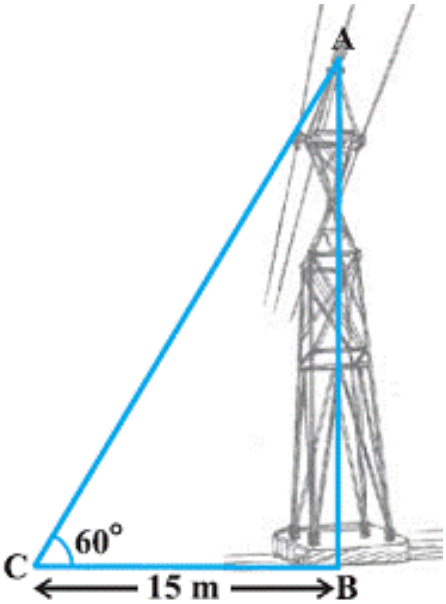
In the adjoining figure, an observer is standing at the top of a building and looking straight ahead at the birds (horizontal line). The observer must lower his eyes to see the car parked (slanting line).

The angle formed between the two lines is called the angle of depression.

We will understand the concept by using following examples:

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

Solution: According to question, we will draw a rough sketch as per our understanding.



In the adjoining figure, we have AB as height of the tower, CB is the distance of the point from the tower and ? ACB is the angle of elevation.

We need to find the height of the tower that is AB.

Also, ACB is a triangle, right-angled at B.

As in the figure Adjacent is known and we need to find out the opposite so we will use trigonometric ratio Tan to solve the problem.

According to question:

AB / BC = Tan 60°

AB / 15 = ?3

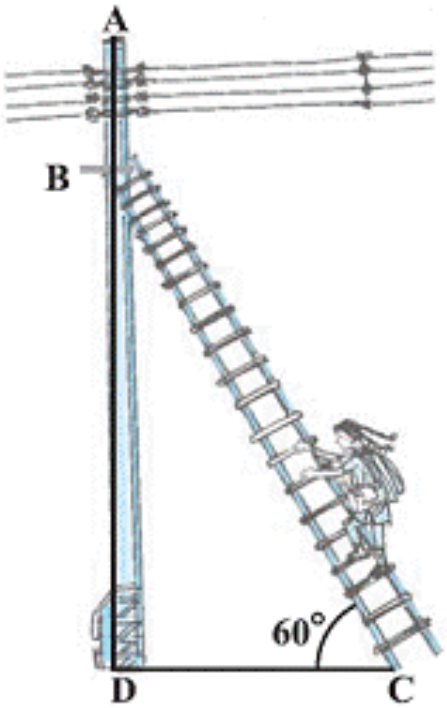
AB = 15?3

Hence, the height of the tower is 15?3 metres.

2. 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 of the pole to undertake the repair work. What should be the length of the ladder that she should use which, when inclined at an angle of 60°

to the horizontal, would enable her to reach the required position? Also, how far from the foot of the pole should she place the foot of the ladder? (?3 = 1.73)

Solution: According to question, we will draw a rough sketch as per our understanding.



In the adjoining figure, BC represents the ladder and AD represents the pole. The electrician has to reach point B so as to repair electric fault.

We first find BD,

BD = AD – AB = 5 – 1.3 = 3.7 meters

We need to find its length, i.e., the hypotenuse of the right triangle BDC.

As hypotenuse is to be calculated and opposite is given, so we will use trigonometric ratio Sin to solve the problem.

Sin 60° = BD / BC

?3 / 2 = 3.7 / BC

On solving we will get BC = 4.28

That is, length of the ladder BC = 4.28 meters (approx.)

Next, we will find the distance of the foot of the ladder from the foot of the pole.

That is DC =?

Now, we will use trigonometric ratio Cot to find DC.

Cot 60° = DC / BD

On solving we will get, DC = 2.14

Therefore, she should place the foot of the ladder at a distance of 2.14 m from the pole.

Now try it yourself! Should you still need any help,click here to schedule live online session with e Tutor!

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Reference Links:

- http://en.wikipedia.org/wiki/Trigonometry
- http://www.answers.com/topic/angle-of-elevation
- http://www.answers.com/topic/angle-of-depression
- http://answers.yahoo.com/question/index?qid=20090404063223AAXjAE8

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