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Trigonometry is one of the important branch of Geometry in mathematics that studies relationships involving lengths and angles of right angled triangles.

Trigonometry is trully involved in real world. In particular, Trigonometry deals in the ratios and relationships between the sides and angles of the triangles.

Trigonometry helps to solve geometrical problems related with the things around us.

With the help of "angle-sum property" we can solve problems related with angles of a triangle and by using Pythagoras theorem we can solve our problems related to sides of right angled triangle. But trigonometry can perform in both the categories of sides and angles.

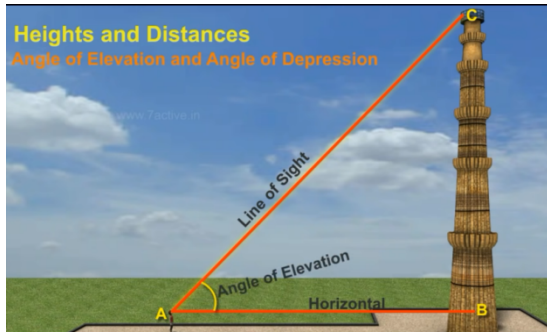
If we know only one side and base angle of a right angled triangle then we can find rest of the two sides and unknown angle.

Most of the things around us stand right angled. With the help of clinometer we can find base angle at which it is inclined from the top to the base. Here trigonometry works and make us capable to find the solutions in real world.

It is used to find the distance of the shore from a point in the sea. It is also used in oceanography in calculating the height of tides in oceans.

Before going to problem let us learn about the kinds of angles. We will see how trigonometry is used for finding the height and distances of various objects without actually measuring them.

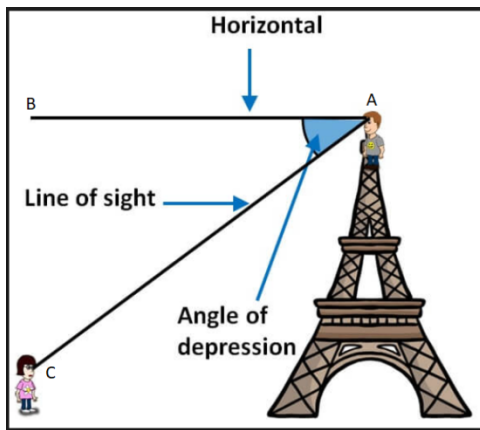
The line of sight is a line drawn from the eye of an observer to the point in the object, viewed by the observer.



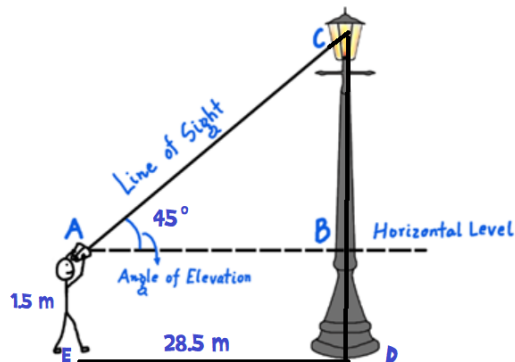
Angle of elevation: In the figure the line AC drawn from the eye of the observer from the point A to the top of tower at C is called the line of sight. The angle BAC, so formed by the line AC and the horizontal line AB is called the Angle of Elevation.

Now consider the situation given in the beginning the Boy standing on the tower is looking down towards a girl's eyes standing at some distance from the tower.

In this case the line of sight is called the angle of depression .



PROBLEM: If we want to find the height CD of tower without actually measuring it. What



information do we need?

Let the distance DE be 28.5 meters at which the boy is standing from the foot of tower. The angle of elevation in angle BAC to the top of minar from the eyes of observer is 45° .

The height AE of the observer is 1.5 meters. From the above condition we can determine the height of tower.

Height of tower is CD which divides into two parts CB and BD so $CD=CB+BD$. Firstly we will find BC in right angled triangle ABC. To find BC we will use trigonometric ratios in which our base angle is A.

In triangle ABC the trigonometric ratio we can use is

$$\tan A = \frac{BC}{AB}$$

$$\tan 45^{\circ} = \frac{BC}{28.5}$$

$$1 = \frac{BC}{28.5} (\because \tan 45^{\circ} = 1)$$

$$BC = 28.5$$

BD is equal to height of observer which is AE 1.5 meters.

So the Height of tower is $BC + BD = 28.5 + 1.5 = 30$ meters

Conclusively we can say with trigonometry we can get the heights and distances of mountains, light houses, buildings, trees, towers, poles, bridges etc. and number of several things which are standing at right angles in our real world.