

# Assignment 1

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**Q10(b)** : A man observes the angle of elevation of the top of the tower to be  $45^\circ$ . He walks towards it in a horizontal line through its base. On covering 20 m the angle of elevation changes to  $60^\circ$ . Find the height of the tower correct to 2 significant figures.

$\therefore$  The height of the tower is 47.32 m

Input parameters:

Variable	value
$\angle CAD = \theta_1$	$45^\circ$
$\angle CBD = \theta_2$	$60^\circ$
$AB = x_1$	$20m$

**Solution:** Let the height of the tower be ' $h$ ' and total distance between man and the tower be ' $d$ '.

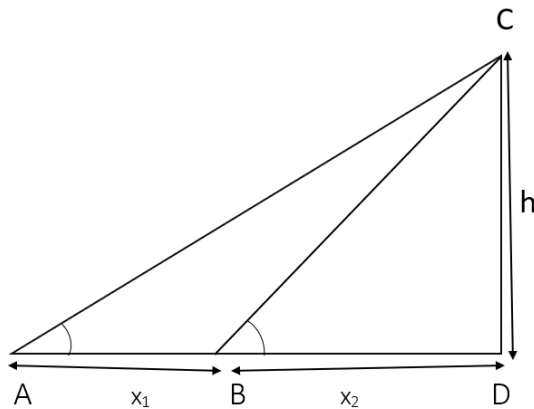


Fig. 1.

Let the given angles be  $\theta_1 = 45^\circ$  and  $\theta_2 = 60^\circ$ .

From the given information,

$$d = x_1 + x_2 \quad (1)$$

$$h \cot \theta_1 = d \quad (2)$$

$$h \cot \theta_2 = x_2 \quad (3)$$

Solving the equations (1),(2),(3), we get

$$h \cot \theta_1 = x_1 + h \cot \theta_2$$

$$h = \frac{x_1}{\cot \theta_1 - \cot \theta_2}$$

$$h = \frac{20}{\left(1 - \frac{1}{\sqrt{3}}\right)}$$

$$h = 47.32m$$