



### Some Applications of Trigonometry Ex 12.1 Q10

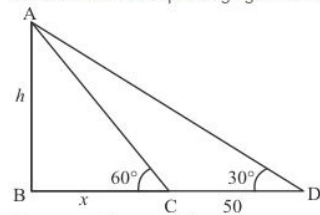
**Answer :**

Let  $AB$  be the tower of height  $h$ . And person makes an angle of elevation of top of tower is  $30^\circ$ , he walks  $50$  m towards the foot of tower then makes an angle of elevation  $60^\circ$

Let  $BC = x$ ,  $CD = 50$ , and  $\angle ACB = 60^\circ$ ,  $\angle ADB = 30^\circ$

Now we have to find height of tower.

We have the corresponding figure as follows



So we use trigonometric ratios.

In a triangle  $ABC$ ,

$$\Rightarrow \tan C = \frac{AB}{BC}$$

$$\Rightarrow \tan 60^\circ = \frac{h}{x}$$

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

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

Again in a triangle  $ADB$ ,

$$\Rightarrow \tan D = \frac{AB}{BC + CD}$$

$$\Rightarrow \tan 30^\circ = \frac{h}{x + 50}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{x + 50}$$

$$\Rightarrow \sqrt{3}h = x + 50$$

$$\Rightarrow \sqrt{3}h = \frac{h}{\sqrt{3}} + 50$$

$$\Rightarrow 3h = h + 50\sqrt{3}$$

$$\Rightarrow 2h = 50\sqrt{3}$$

$$\Rightarrow h = 25\sqrt{3}$$

$$\Rightarrow h = 25 \times 1.73$$

$$\Rightarrow h = 43.25$$

Hence the height of tower is 43.25 m.

Some Applications of Trigonometry Ex 12.1 Q11

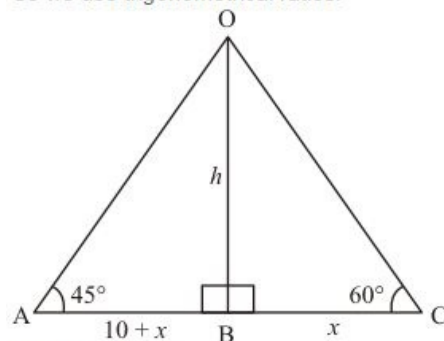
**Answer :**

Let  $h$  be height of tower  $AB$  and angle of elevation are  $45^\circ$  and  $60^\circ$  are given.

In a triangle  $OAC$ , given that  $AB = 10+x$  and  $BC = x$

Now we have to find height of tower.

So we use trigonometrical ratios.



In a triangle  $OAB$ ,

$$\Rightarrow \tan A = \frac{OB}{AB}$$

$$\Rightarrow \tan 45^\circ = \frac{OB}{AB}$$

$$\Rightarrow 1 = \frac{h}{10+x}$$

$$\Rightarrow h = 10+x$$

Therefore  $x = h - 10$

Again in a triangle  $OCB$ ,

$$\Rightarrow \tan C = \frac{OB}{BC}$$

$$\Rightarrow \tan 60^\circ = \frac{OB}{BC}$$

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

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

Put  $x = h - 10$

$$\Rightarrow h = \sqrt{3}(h - 10)$$

$$\Rightarrow h = \sqrt{3}h - 10\sqrt{3}$$

$$\Rightarrow 10\sqrt{3} = h(\sqrt{3} - 1)$$

$$\Rightarrow h = \frac{10\sqrt{3}}{(\sqrt{3} - 1)}$$

$$\Rightarrow h = \frac{10 \times 1.732}{(1.732 - 1)}$$

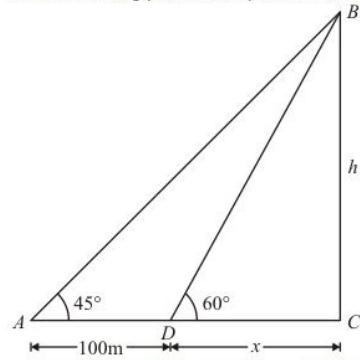
$$\Rightarrow h = \frac{17.32}{0.372}$$

$$\Rightarrow h = 23.66$$

Hence height of tower is 23.66 m.

**Answer :**

Let BC be the height  $h$  of the parachutist and makes an angle of elevations  $45^\circ$  and  $60^\circ$  respectively at two observing points 100 apart from each other.



Let  $AD=100$ ,  $CD=x$ ,  $BC=h$  and  $\angle CAB = 45^\circ$ ,  $\angle CDB = 60^\circ$   
So we use trigonometric ratios.

In triangle BCD

$$\tan 60^\circ = \frac{h}{x}$$

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

Now in triangle ABC,

$$\tan 45^\circ = \frac{h}{x+100}$$

$$\Rightarrow 1 = \frac{h}{x+100}$$

$$\Rightarrow x+100 = h$$

$$\Rightarrow \frac{h}{\sqrt{3}} + 100 = h$$

$$\Rightarrow h + 100\sqrt{3} = \sqrt{3}h$$

$$\Rightarrow h = \frac{100\sqrt{3}}{\sqrt{3}-1}$$

$$\Rightarrow h = 50(3+\sqrt{3})$$

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

$$x = \frac{50(3+\sqrt{3})}{\sqrt{3}}$$

$$= 50(1+\sqrt{3})$$

Hence the maximum height is  $50(3+\sqrt{3})$  m = 236.6 m. and distance is  $50(1+\sqrt{3})$  m = 136.6 m.

\*\*\*\*\* END \*\*\*\*\*