



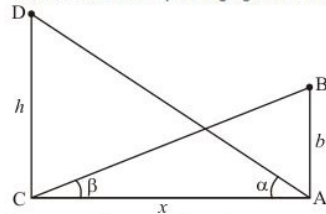
### Some Applications of Trigonometry Ex 12.1 Q55

**Answer :**

Let  $h$  be the height of tower  $CD$ . The tower  $CD$  subtends an angle  $\alpha$  at a point  $A$ . And the angle of depression of foot of tower at a point  $b$  meter just above  $A$  is  $\beta$ . Let  $AC = x$  and  $\angle ACB = \beta$ ,  $\angle CAD = \alpha$ .

Here we have to prove height of tower is  $b \tan \alpha \cot \beta$

We have the corresponding figure as follows



So we use trigonometric ratios.

In  $\triangle ABC$ ,

$$\Rightarrow \tan \beta = \frac{AB}{AC}$$

$$\Rightarrow \tan \beta = \frac{b}{x}$$

$$\Rightarrow x = \frac{b}{\tan \beta}$$

$$\Rightarrow x = b \cot \beta$$

Again in  $\triangle ACD$

$$\Rightarrow \tan \alpha = \frac{CD}{AC}$$

$$\Rightarrow \tan \alpha = \frac{h}{x}$$

$$\Rightarrow h = x \tan \alpha$$

$$\Rightarrow h = b \tan \alpha \cot \beta$$

Hence the height of tower is  $b \tan \alpha \cot \beta$ .

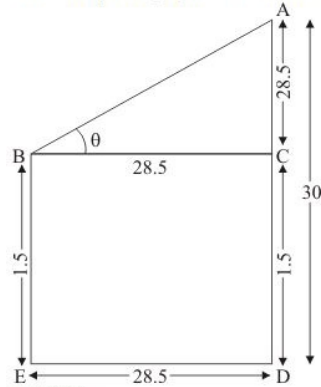
### Some Applications of Trigonometry Ex 12.1 Q56

**Answer :**

Let  $BE$  be the observer of 1.5 m tall. And  $AD$  be the tower of height 30. Here we have to find angle of elevation of the top of tower.

Let  $\angle ABC = \theta$

The corresponding figure is as follows



In  $\triangle ABC$ ,

$$\Rightarrow \tan \theta = \frac{AC}{BC}$$

$$\Rightarrow \tan \theta = \frac{28.5}{28.5}$$

$$\Rightarrow \tan \theta = 1$$

$$\Rightarrow \theta = 45^\circ$$

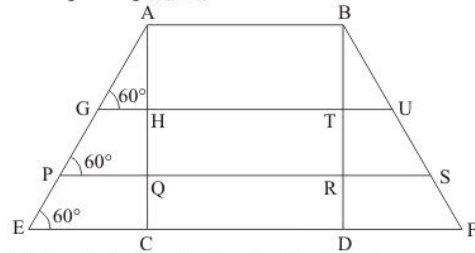
Hence the required angle is  $\boxed{45^\circ}$ .

Some Applications of Trigonometry Ex 12.1 Q57

**Answer :**

Let the length of stool,  $AB = 0.5$  m, height  $AC = 1.5$  m and its leg inclined at an angle of  $60^\circ$  to the ground.

Let length of leg  $AE = h$  m.



We have to find length of leg, lengths of two steps equal in length.

In  $\triangle AEC$ ,  $\angle AEC = 60^\circ$

$$\sin 60^\circ = \frac{AC}{AE}$$

$$\Rightarrow \frac{\sqrt{3}}{2} = \frac{1.5}{h}$$

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

$$\Rightarrow h = 1.732$$

In  $\triangle AGH$ ,  $\angle AGH = 60^\circ$  and  $AH = 0.5$  m

$$\tan 60^\circ = \frac{AH}{GH}$$

$$\Rightarrow \sqrt{3} = \frac{0.5}{GH}$$

$$\Rightarrow GH = \frac{0.5}{\sqrt{3}}$$

$$\Rightarrow GH = 0.2886$$

$$\text{Total length} = 0.5 + (0.2886 \times 2) = 1.1077 \text{ m.}$$

In  $\triangle APQ$ ,  $\angle APQ = 60^\circ$  and  $AQ = 1$  m

$$\tan 60^\circ = \frac{AQ}{PQ}$$

$$\Rightarrow \sqrt{3} = \frac{1}{PQ}$$

$$\Rightarrow PQ = \frac{1}{\sqrt{3}}$$

$$\Rightarrow PQ = 0.577$$

$$\text{Total lengths } 0.5 + (0.577 \times 2) = 1.654 \text{ m}$$

Hence the length of leg is  $\boxed{1.732}$  m.

And lengths of each step are  $\boxed{1.1077}$  m and  $\boxed{1.654}$  m.

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