$\Rightarrow h = 20\sqrt{3} - 20$

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

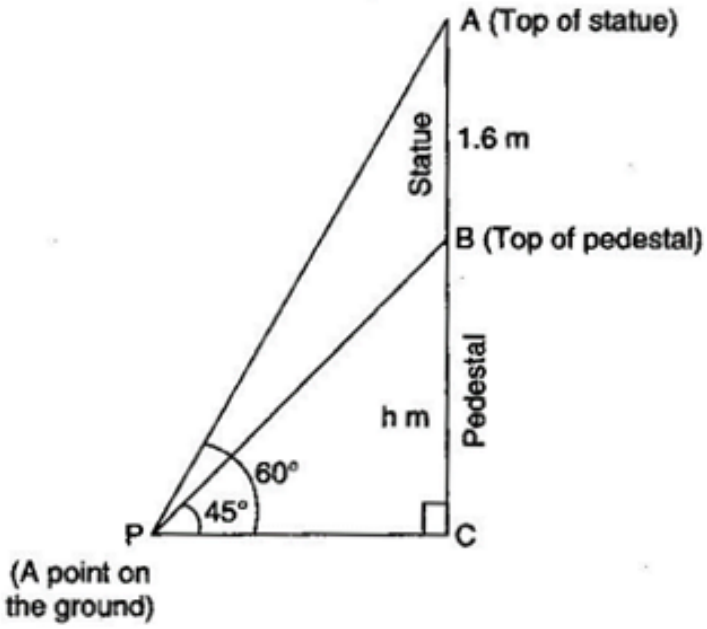
$\therefore$ The height of the tower is $20\left(\sqrt{3} - 1\right)$ m.

Q8. A statue, 1.6 m tall, stands on the top of a postal. From a point on the ground, the angle of elevation of the top of the statue is 60° and from the same point the angle of elevation of the top of the pedestal is 45°. Find the height of the pedestal.

Ans: Let the height of the pedestal be h m.

$\therefore$ BC = h m

In right triangle ACP,



$$\tan 60^\circ = \frac{AC}{PC}$$

$$\Rightarrow \sqrt{3} = \frac{AB + BC}{PC}$$

$$\Rightarrow \sqrt{3} = \frac{1.6 + h}{PC} \quad \text{.....(i)}$$

In right triangle BCP,

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

$$\Rightarrow 1 = \frac{h}{PC} \Rightarrow PC = h$$

$$\therefore \sqrt{3} = \frac{1.6 + h}{h} \quad \text{[From eq. (i)]}$$

$$\Rightarrow \sqrt{3}h = 1.6 + h$$

$$\Rightarrow h\left(\sqrt{3} - 1\right) = 1.6$$

$$\Rightarrow h = \frac{1.6}{\sqrt{3}-1}$$

$$\Rightarrow h = \frac{1.6\left(\sqrt{3}+1\right)}{\left(\sqrt{3}-1\right)\left(\sqrt{3}+1\right)}$$

$$\Rightarrow h = \frac{1.6\sqrt{3}+1}{3-1}$$

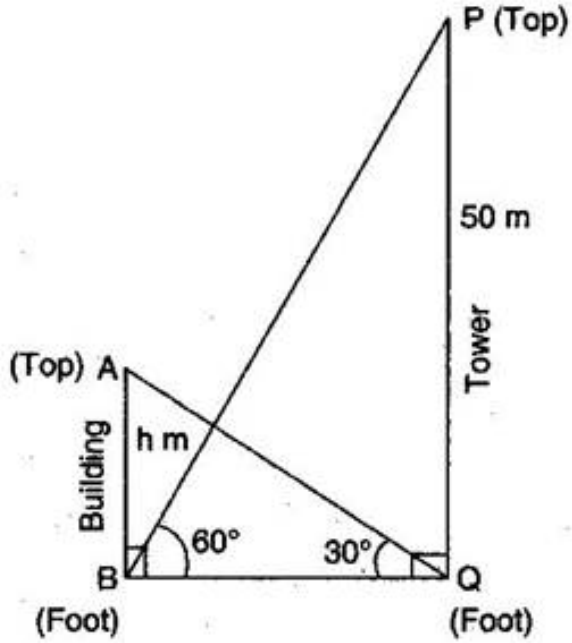
$$\Rightarrow h = \frac{1.6\left(\sqrt{3}+1\right)}{2}$$

$$\Rightarrow h = 0.8\left(\sqrt{3}+1\right) \text{ m}$$

Hence, the height of the pedestal is $0.8\left(\sqrt{3}+1\right)$ m.

Q9. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60°. If the tower is 50 m high, find the height of the building.

Ans: Let the height of the building be h m.



$$\tan 60^\circ = \frac{PQ}{BQ} \Rightarrow \sqrt{3} = \frac{50}{BQ}$$

$$\Rightarrow BQ = \frac{50}{\sqrt{3}} \text{ m.....(i)}$$

In right triangle ABQ,

$$\tan 30^\circ = \frac{AB}{BQ} \Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{BQ}$$

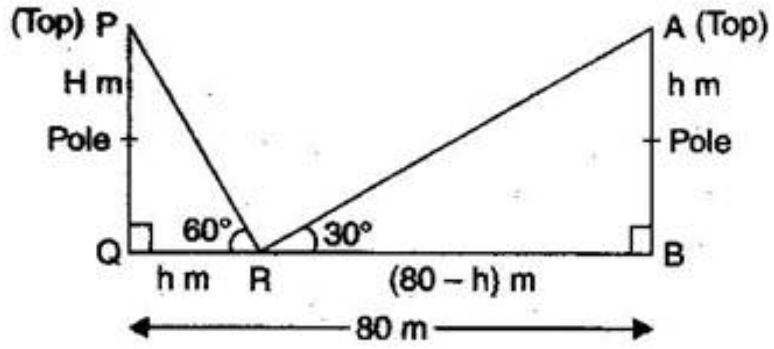
$$\Rightarrow BQ = h\sqrt{3} \text{ m.....(ii)}$$

From eq. (i) and (ii),

$$h\sqrt{3} = \frac{50}{\sqrt{3}} \Rightarrow h = \frac{50}{3} = 16\frac{2}{3} \text{ m}$$

Q10. Two poles of equal heights are standing opposite each other on either side of the road, which is 80 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° and 30° respectively. Find the height of the poles and the distances of the point from the poles.

Ans: In right triangle PRQ,



$$\tan 60^\circ = \frac{PQ}{QR} \Rightarrow \sqrt{3} = \frac{H}{h}$$

$$\Rightarrow H = h\sqrt{3} \text{ m} \ldots\ldots\ldots\text{(i)}$$

In right triangle ABR,

$$\tan 30^\circ = \frac{AB}{BR}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{H}{80-h}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{h\sqrt{3}}{80-h} \text{ [From eq. (i)]}$$

$$\Rightarrow 80 - h = 3h$$

$$\Rightarrow 4h = 80$$

$$\Rightarrow h = 20 \text{ m}$$

$$\therefore H = h\sqrt{3} = 20\sqrt{3} \text{ m}$$

Also, BR = $80 - h$ = 80 – 20 = 60 m

Hence the heights of the poles are $20\sqrt{3}$ m each and the distances of the point from poles are 20 m and 60 m respectively.

********** END **********