Solution Book of Mathematic

Ssnior 2 Part I

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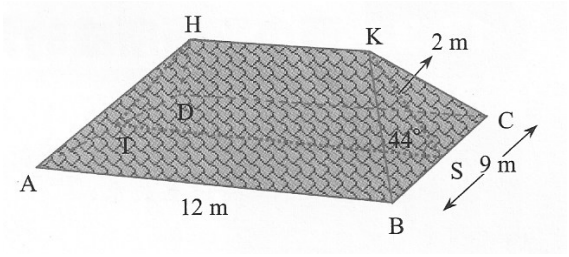
Written on 9 October 2022

Contents

1. The diagram below shows a roof, HK is the ridge of the roof, its edges HA, HD, KB, KC are euqal in length. Both of the planes HAD and KBC form a 44^o angle with plane $ABCD$. Given that S and T are the midpoints of BC and AD respectively. Find:



(a) The distance from line HK to plane $ABCD$.

Sol.

Let the foot point of K on plane $ABCD$ be P.

$$\begin{aligned}\text{In } \Delta KPS, \sin\angle KSP &= \frac{KP}{KS}\\ \sin 44^\circ &= \frac{KP}{2}\\ KP &= 2\sin 44^\circ\\ &\approx 1.39m\end{aligned}$$

(b) The length of HK.

Sol.

$$\begin{aligned}\cos\angle KSP &= \frac{PS}{KS}\\ \cos 44^\circ &= \frac{PS}{2}\\ PS &= 2\cos 44^\circ\\ &\approx 1.44m\\ HK &\approx 12 - 2PS\\ &\approx 12 - 2.88\\ &\approx 9.12m\end{aligned}$$

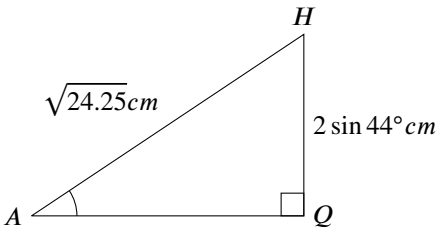
(c) The angle formed by line HA and plane $ABCD$.

Sol.

Let the foot point of H on plane $ABCD$ be Q.

$$\begin{aligned}HA &= \sqrt{HT^2 + AT^2}\\ &= \sqrt{2^2 + 4.5^2}\\ &= \sqrt{24.25}cm\end{aligned}$$

The angle formed by line HA and plane $ABCD$ is $\angle HAQ$.

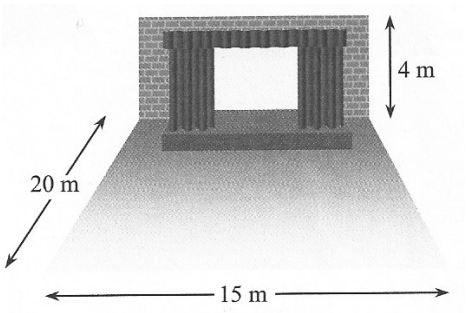


$$\begin{aligned}\sin\angle HAQ &= \frac{HQ}{HA}\\ \sin\angle HAQ &= \frac{2\sin 44^\circ}{\sqrt{24.25}}\\ \angle HAQ &\approx 16.38^\circ\end{aligned}$$

2. The length, width and height of a hall are $20m$, $15m$, and $4m$ respectively. Find:

(a) The length of the diagonal of the hall.

(b) The angle formed by the diagonal and the floor of the hall.



3. In the diagram below, $ABCD$ represents a rectangular plank with length and width of $60cm$ and $36cm$ respectively, its base BC is on the ground and the top of it lies on the wall. Assume that the distance between BC and the corner of the wall is $12cm$, find the angle formed by the diagonal BD of the plank and the ground.