

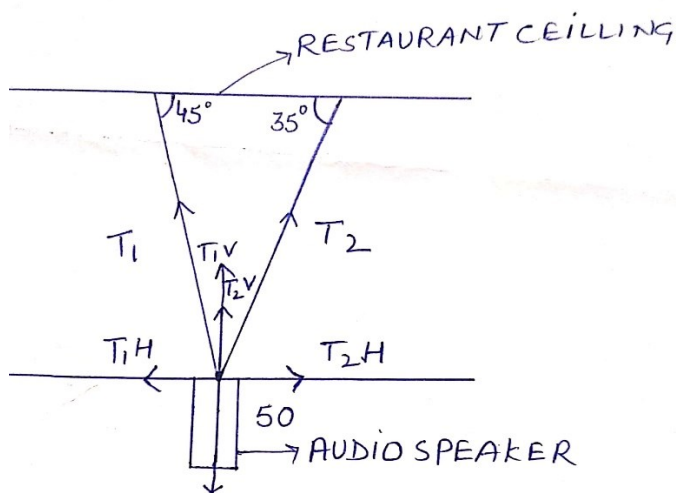
## Answer to Question #88642 – Math – Trigonometry

### Question

An audio speaker that weighs 50 pounds hangs from the ceiling of a restaurant from two cables (45 degrees left and 35 degrees right). To two decimal places, what is the tension in the two cables?

### Solution

As given an audio speaker that weight 50 pounds hangs from ceiling of restaurant from cables as shown in figure below.



Let  $T_1$  be the tension in cable which make 45 degree and  $T_2$  is the tension in cable which make 35-degree angle.

Now, the sum of two vertical component of tensions must be equal to 50 pounds and horizontal component of tensions must be equal and opposite.

$$\text{Vertical component of Tension } T_{1V} = T_1 \sin 45^\circ$$

$$\text{Vertical component of Tension } T_{2V} = T_2 \sin 35^\circ$$

$$\text{Horizontal component of Tension } T_{1H} = T_1 \cos 45^\circ$$

$$\text{Horizontal component of Tension } T_{2H} = T_2 \cos 35^\circ$$

$$T1 \sin 45^\circ + T2 \sin 35^\circ = 50 \quad (i)$$

$$T1 \cos 45^\circ = T2 \cos 35^\circ \quad (ii)$$

Solving (i) and (ii)

$$T1 = \frac{T2 \cos 35^\circ}{\cos 45^\circ}$$

$$T1 = 1.16 T2$$

$$1.16 T2 \sin 45^\circ + T2 \sin 35^\circ = 50$$

$$T2(.82 + .57) = 50$$

$$T2 = 35.97(\text{pounds})$$

$$T1 = 1.16 * 35.97 = 41.72 (\text{pounds}).$$

**Answer:**

$T1 = 41.72$  pounds and  $T2 = 35.97$  pounds.