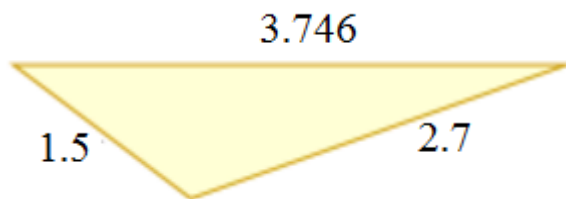


Answer on Question #64260-Engineering-Civil and Environmental Engineering

A mass of 500kg is suspended from a beam by two chains, 1,5m and 2,7m long respectively. The distance between the suspension points is 3,746m. Determine:

- a) the load in each chain
- b) the vertical and horizontal reactions at the suspension points

Solution



a) The angle between left chain (1) and horizontal direction is 19.46° .

The angle between right chain (2) and horizontal direction is 36.85° .

$$T_1 \cos 19.46^\circ = T_2 \cos 36.85^\circ \rightarrow T_2 = \frac{T_1 \cos 19.46^\circ}{\cos 36.85^\circ}$$

$$T_1 \sin 19.46^\circ + T_2 \sin 36.85^\circ = 500(9.8)$$

$$T_1 \sin 19.46^\circ + \frac{T_1 \cos 19.46^\circ}{\cos 36.85^\circ} \sin 36.85^\circ = 500(9.8)$$

The loads are:

$$T_1 = \frac{500(9.8)}{\sin 19.46^\circ + \frac{\cos 19.46^\circ}{\cos 36.85^\circ} \sin 36.85^\circ} = 4712 \text{ N.}$$

$$T_2 = \frac{4712 \cos 19.46^\circ}{\cos 36.85^\circ} = 5552 \text{ N.}$$

b) The vertical and horizontal reactions at the left point:

$$N_{1y} = T_1 \sin 19.46^\circ = 4712 \sin 19.46^\circ = 1570 \text{ N}$$

$$N_{1x} = T_1 \cos 19.46^\circ = 4712 \cos 19.46^\circ = 4443 \text{ N}$$

The vertical and horizontal reactions at the right point:

$$N_{2y} = T_2 \sin 36.85^\circ = 5552 \sin 36.85^\circ = 3330 \text{ N}$$

$$N_{2x} = T_2 \cos 36.85^\circ = 5552 \cos 36.85^\circ = 4443 \text{ N}$$