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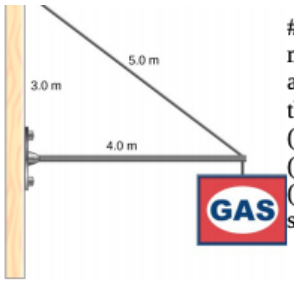
# Question: 5.0 m 3.0 m #2. A 400.0-N sign hangs from the end of a uniform strut. The strut is 4.0 m long and...




#2. A 400.0-N sign hangs from the end of a uniform strut. The strut is 4.0 m long and weighs 600.0 N. The strut is supported by a hinge at the wall and by a cable whose other end is tied to the wall at a point 3.0 m above the left end of the strut.
(A) Draw all the forces acting on the strut.
(B) Find the tension in the supporting cable.
(C) Find the force (magnitude and direction) that the hinge puts on the strut.

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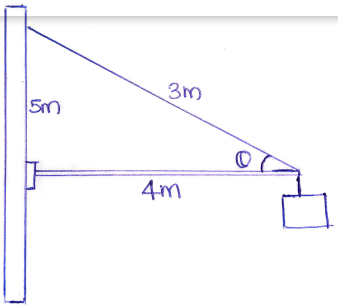
## Expert Answer

Anonymous
answered this

Solution

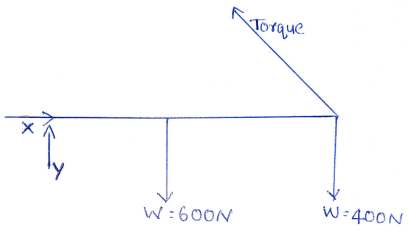



Note that the weight of struct is also acting on the middle of struct because it is in equilibrium.( Which is not draw).struct length is 4m

**A).**Here we have 3 forces .

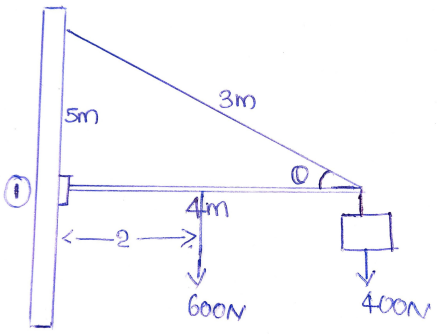
400N weight of object , 600N weight of struct , Torque

So the force diagram can drawn as




**B).**Here using the concept of torque.

For this consider a point 1 .In point 1 sum of torque is zero




$$\sum T_1 = 0$$

Consider the torques at point 1

Note that Torque = force acting on object × perpendicular distance

Consider clockwise is positive and anticlickwise is negative

Total torque

400×4+600×2-T×4×(3/5)

=1166.6N

=1167N

**C).**To find totalforce we have to find vertical forces and horizontal forces .

Remember torque have both horizontal and vertical component

Sum of Vertical force is zero for equilibrium condition.

Refer force diagram

1167×(3/5) +y-600-400 =0

y =( 600+400)×(5/1163)

=300N (up)

In equilibrium condition sum of horizontal force is zero

X -1167×(4/5)

X=1167×(4/5)

=933.6N( to right)

= 933N(taking this )

Net force = $\sqrt{x^2 + y^2}$

=$\sqrt{933^2 + 300^2}$

= 980N

Direction$\Theta = tan^{-1}(y/x)$

$\Theta = tan^{-1}(300/933)$

= $17.82^0$

approximately equal to $18^0$ above horizontal

0 Comments

Was this answer helpful? 0 0

## Practice with similar questions

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See answer