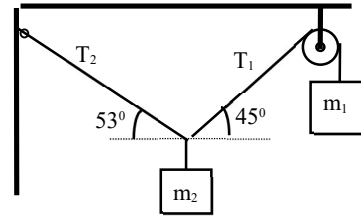
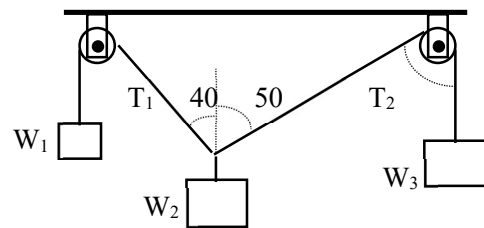


**PHY1010 (2020/21)**  
**Tutorial Sheet 8**  
**Static Equilibrium**

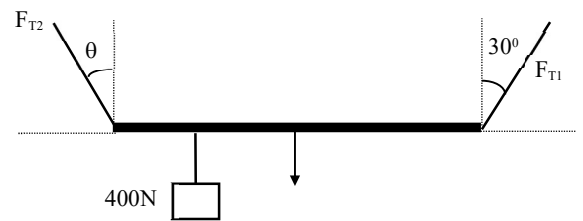
01. The system in the figure is at equilibrium when  $m_1 = 10 \text{ kg}$ . Find the values of  $T_1$ ,  $T_2$ , and  $m_2$ . Assume the pulley to be massless and frictionless so that it does not change the tension in the cord. [98 N, 115.5 N, 16.5 kg,]



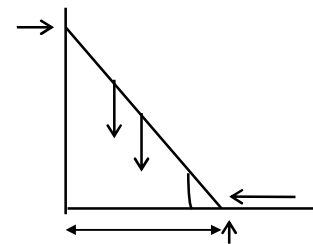
02\*. For the equilibrium situation shown in the figure, find  $W_3$  and  $W_2$ . Assume that  $W_1=800 \text{ N}$  and that the pulleys are frictionless, so that they do not change the tensions in the cords. [665 N, 1044 N]



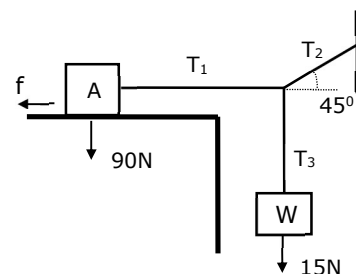
03\*\*. The uniform 120 N board is supported by two ropes as shown. A 400 N weight is suspended one-quarter of the way from the left end. Find the angle  $\theta$  made by the left rope and  $F_{T1}$ ,  $F_{T2}$ . [14.4°, 184.8 N, 360 N]



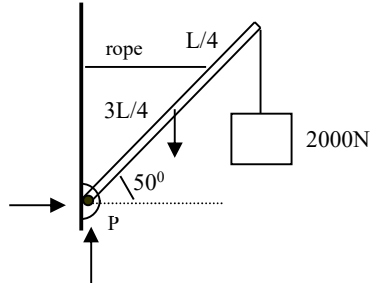
04\*. A uniform ladder 5 m long weighing 200 N is leaning against a frictionless vertical wall with its base 3m from the wall. The coefficient of static friction between the bottom of the ladder and the ground is 0.45. How far, measured along the ladder, can a 600 N man climb before the ladder starts to slip? [3.16 m along the ladder]



05\*. Show that the static friction force between the block A and the surface can hold the system in equilibrium for the weight of block A given. Take  $\mu_s = 0.30$  [ $T_1 = 15 \text{ N}$ ,  $f = 27 \text{ N}$ ]



06\*. A uniform, 400N boom is supported as shown. Find the tension in the tie rope and the forces exerted on the boom by the pin at  $P$ . [2460 N, 2400 N,



07. The mast of a sailboat is held by two steel cables attached as shown. The front cable has a tension of  $5000\text{N}$ . What is the tension in the rear cable? What force does the foot of the mast exert on the sailboat? Neglect the weight of the mast. The foot of the mast is hinged (hence exerts no torque). [3536 N, 6830 N]

