

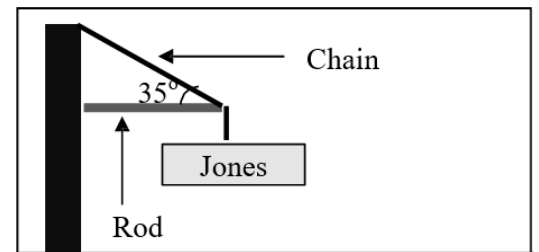
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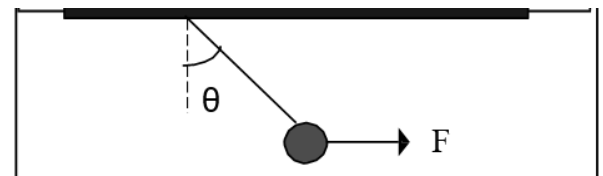
WS 2.4: Translational Equilibrium

Unit 2: Dynamics and Equilibrium

1. Ms. Jones has attached a sign that has a weight of 495 N to a wall outside her office, as shown at right. The tension in the chain is 863 N. Determine the thrust force exerted by the rod.



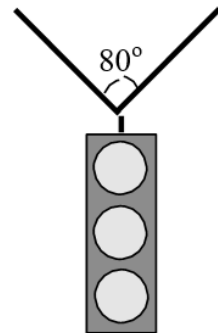
2. It is found that the system at right comes to equilibrium with θ equal to 40° when $F = 200$ N and the tension in the chain is 311 N. How much does the ball weigh?



3. Three men are pulling on ropes attached to a tree the first man exerts a force of 6.0 N north, the second a force of 35 N east, and the third 40 N to the south. (a) Find the magnitude of the resultant force on the tree. (b) What is the magnitude of the equilibrant force?

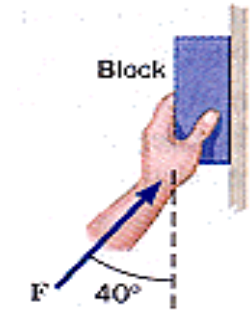
4. A boy and a girl carry a 118 N bucket of water by holding the ends of a rope with the bucket attached at the middle. If there is an angle of 100.0° between the two segments of the rope and has a horizontal component of 70.3 N, what is the tension in each part of the rope?

5. A traffic light is supported by two wires, as shown at right. If the maximum tension in each wire is 750 N and the angle between the wires is 80° where the horizontal component is 482 N, what is the maximum weight of the light they can support?

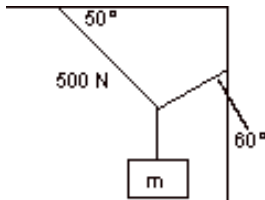


6. A lawn mower weighs 1274 N. A person tries to push the mower up a hill that is inclined 15° to the horizontal. How much force does the person have to exert along the handle just to keep the mower from rolling down the hill if the normal force exerted on the lawn mower by the ground is 1230.5 N, assuming that the handle is parallel to the ground?
7. A 20000 N car is parked on an incline that makes an angle of 30.0° with the horizontal. The normal force the ground is exerting on the car is 17321 N. If the maximum force the brakes can withstand is 12000 N, will the car remain at rest?
8. A 19600 N car is to be held on a 20.0° incline by a rope in which the maximum tension is 8000 N. The normal force the ground is exerting on the car is 18418 N. Will the rope support the car?

9. A block is prevented from sliding down a wall with a force, F as shown below. The coefficient of static friction between the block and the wall is $\mu_s = 0.2$. If the mass of the block is 5 kg, what is the **minimum** force, F , required to prevent the block from sliding down the wall?



10. Determine the magnitude of the hanging mass, m . Show all work and construct a vector diagram labeling any forces clearly. The tension in the left-hand cable is 500N and the angle between this cable and the ceiling is 50° . The angle between the right-hand cable and the wall is 60° .



11. To hang a 6.20 kg pot of flowers, a gardener uses two wires—one attached horizontally to a wall, the other sloping upward at an angle of $\theta = 40^\circ$ and attached to the ceiling. Find the tension in each rope.

