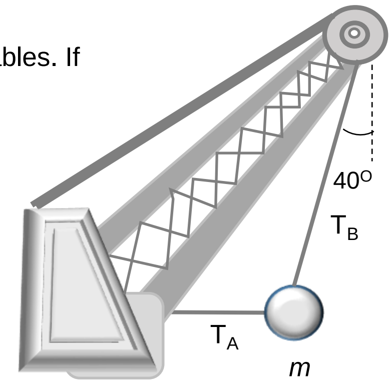
Class Problems - Chapter 5

Problem 1)

A large wrecking ball is held in place by two light steel cables. If the mass of the wrecking ball m = 4090 kg, what are the tension T_A and T_B in the cables.

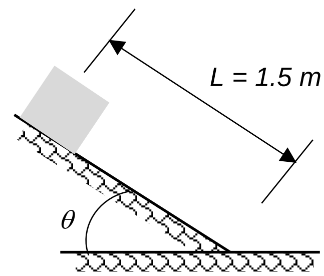


Problem 2)

An 8.00-kg block of ice, released from rest at the top of a 1.5-m-long frictionless ramp, slides downhill, reaching a speed of 2.5 m/s at the bottom.

a) What is the angle between the ramp and the horizontal?

b) What would be the speed of the ice at the bottom if motion were opposed by a constant friction force of 10.0 N parallel to the surface of the ramp?



Problem 3)

A stockroom worker pushes a box with mass 11.2 kg on a horizontal surface with constant speed of 3.50 m/s. The coefficient of kinetic friction between the box and the surface is 0.20.

a) What horizontal force must the worker apply to maintain the motion?

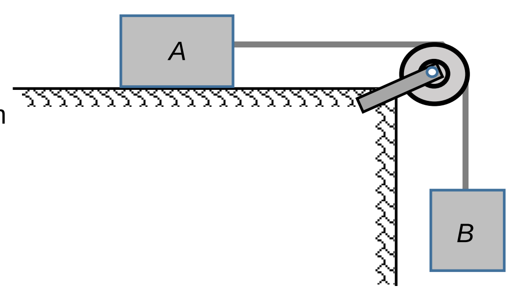
b) If the force calculated in part (a) is removed, how far does the box slide before coming to rest?

Problem4)

Block A (mass 2.25) rests on a tabletop. It is connected by a horizontal cord passing over a light, frictionless pulley to a hanging block B (mass 1.30 kg). The coefficient of kinetic friction between block A and the tabletop is 0.450. After the block are released from rest, find

a) speed of each block after moving 3.0 cm, and

b) the tension in the cord. Include the free-body diagram or diagrams you used to determine the answer.



Problem 5)

A machine part consists of a thin 40.0-cm-long bar with small 1.15 kg masses fastened by screws to its ends. The screws can support a maximum force of 75.0 N without pulling out. This bar rotates about an axis perpendicular to it at its center.

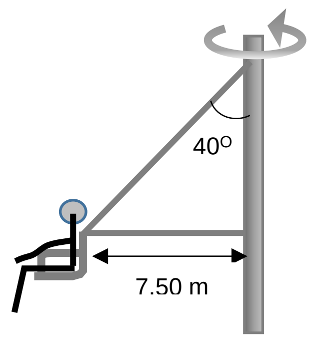
a) As the bar is turning at a constant rate on a horizontal, frictionless surface, what is the maximum speed the masses can have without pulling out the screw?

b) Suppose the machine is redesigned so that the bar turns at a constant rate in a vertical circle. Will one of the screws be more likely to pull out when the mass is at the top of the circle or at the bottom? Use a free-body Diagram to see why.

c) Using the result of part (b), what is the greatest speed the masses can have without pulling a screw?

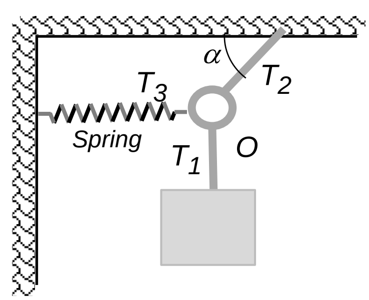
Problem 6)

The Giant Seat at a county fair, the seat is connected to two cables as shown, one of which is horizontal. The seat swings in a horizontal circle at a rate of 32.0 rpm (rev / min). If the seat weighs 255 N and an 825-N person is sitting in it, find the tension in each cable.



Problem 7)

A block of weight W is suspended from a chain linked at O to two other chains. Draw the free-body-diagrams of the block, and ring.



Problem 8)

A block is held at rest by a cable on a frictionless ramp ($0 < \alpha < 90^{\circ}$) The ramp exerts a normal force , ***n***, on the block. How does the magnitude of the normal force compare to the weight W of the block. Explain for full credit.

A. n = W
B. n < W
C. n > W
D. Depending on the slope of the ramp,two of these are possible.
E. Depending on the slope of the ramp,all three of these are possible.