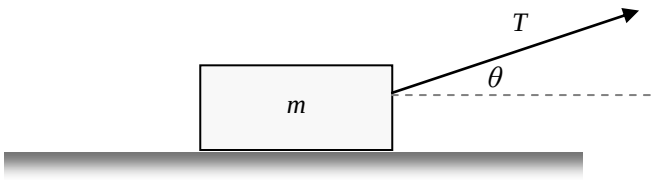
MULTIPLE CHOICE REVIEW: CHAPTERS 4 – 5



A block of mass *m* is pulled with constant velocity over a floor by a force *T* inclined at an angle *θ* with the floor as shown above. The coefficient of friction between the block and floor is *α*.

1974 – 67. The magnitude of the vertical component of the force exerted on the block by the floor is . . .

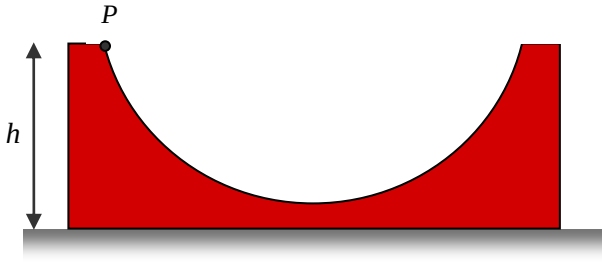
a. $m \cdot g$
b. $m \cdot g - T \cdot \cos \theta$
c. $m \cdot g + T \cdot \cos \theta$
d. $m \cdot g - T \cdot \sin \theta$
e. $T \cdot \sin \theta$

1974 – 68. The magnitude of the frictional force is . . .

a. $T \cdot \cos \theta$
b. $T \cdot \sin \theta$
c. zero
d. $\alpha \cdot m \cdot g$
e. $\alpha \cdot T \cdot \cos \theta$

1988 – 6. A horizontal force *F* is used to pull a 5 kg block across a floor at a constant speed of 3 m/s. The frictional force between the block and the floor is 10 N. The work done by the force *F* in 1 minute is most nearly . . .

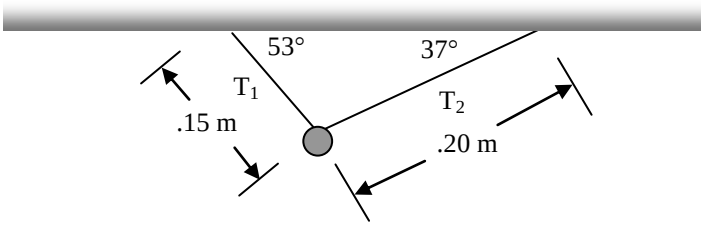
a. 0 J.
b. 30 J.
c. 600 J.
d. 1350 J.
e. 1800 J.



1993 – 4. The figure above shows a rough semicircular track whose ends are at a vertical height *h*. A block placed at point *P* at one end of the track is released from rest and slides past the bottom of the track. Which of the following is true of the height to which the block rises on the other side of the track?

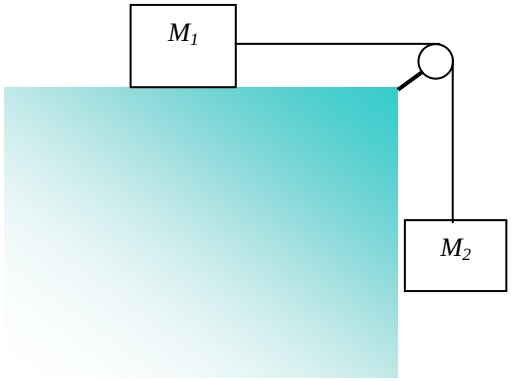
a. It is equal to $\pi \cdot h/2$.
b. It is equal to $h/4$.
c. It is equal to $h/2$.
d. It is equal to *h*.
e. It is between zero and *h*; the exact height depends on how much energy is lost to friction.

FREE RESPONSE REVIEW: CHAPTERS 4 – 5



1980 – 1. A ball of weight 5.0 Newtons is suspended by two strings as shown above.

(a) Draw and clearly label all the forces that act on the ball.
(b) Determine the magnitude of each of the forces indicated in Part (*a*)



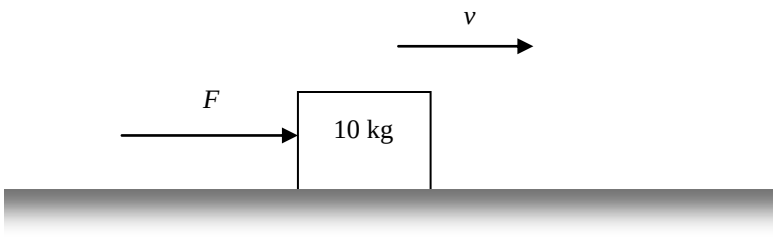
1987 – 1. In the system shown above, the block of mass M_1 is on a rough horizontal table. The string that attaches it to the block of mass M_2 passes over a frictionless pulley of negligible mass. The coefficient of kinetic friction, μ_k, between M_1 and the table is less than the coefficient of static friction μ_s.

(a) Draw and identify all the forces acting on the block of mass M_1.
(b) In terms of M_1 and M_2, determine the minimum value of μ_s that will prevent the blocks from moving.

The blocks are set in motion by giving M_2 a momentary downward push. In terms of M_1, M_2, μ_k, and g, determine each of the following:

(c) The magnitude of the acceleration of M_1.
(d) The tension in the string.

FREE RESPONSE REVIEW: CHAPTERS 4 – 5 *(CONT)*



1981 – 1. A 10-kilogram block is pushed along a rough horizontal surface by a constant horizontal force *F* as shown above. At time *t* = 0, the velocity *v* of the block is 6.0 meters per second in the same direction as the force. The coefficient of sliding friction is .20. Assume *g* = 10 m/s^2.

(a) Calculate the force *F* necessary to keep the velocity constant.

The force is now changed to a larger constant value *F'*. The block accelerates so that its kinetic energy increases by 60 Joules while it slides a distance of 4.0 meters.

(b) Calculate the force *F'*.
(c) Calculate the acceleration of the block.

1988 – 2. A ball thrown vertically downward strikes a horizontal surface with a speed of 15 meters per second. It then bounces, and reaches a maximum height of 5 meters. Neglect air resistance on the ball.

(a) What is the speed of the ball immediately after it rebounds from the surface?
(b) What fraction of the ball's initial kinetic energy is apparently lost during the bounce?