Questions

Chapter 6
Force and Motion - II

6-1 Friction

6-2 Uniform Circular Motion

6-1 Friction
M1-062

A box of mass *M* is placed on a 30° inclined plane. The box is sliding with an acceleration equals g/2 (g is the free fall acceleration). What is the magnitude of the force of friction between the box and the plane?

A) 2*M*g
B) *M*g/2
C) *M*g
D) 0.866 *M*g
E) zero

Answer E

6-1 Friction
M1-061

A box with a weight of 50 N rests on a horizontal surface with μ_s= 0.40. A person pulls horizontally on it with a force of F_2=10 N and it does not move. To start it moving, a second person pulls vertically upward on the box with a force F_1 (see Fig 6). What is the smallest vertical force (F_1) for which the box starts moving?

A) 14 N
B) 10 N
C) 35 N
D) 5.0 N
E) 25 N

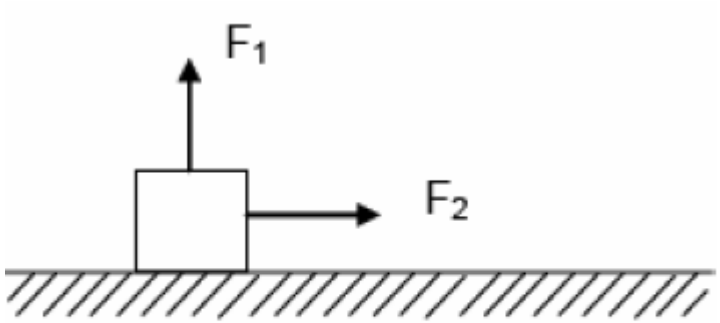


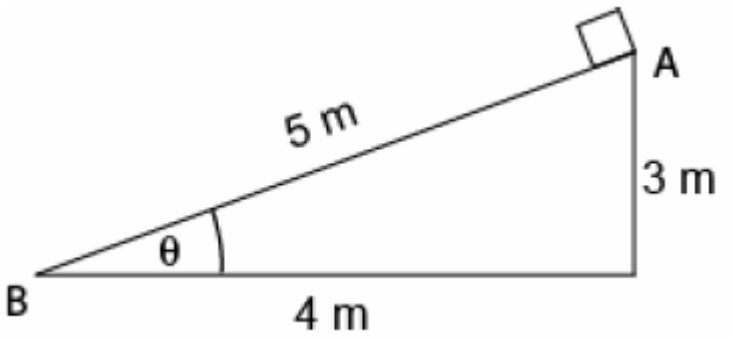
Figure 6

Answer E

6-1 Friction
M1-061

A 2.0 kg block is released from rest the top of a ramp (point A) as shown in Fig 8. The coefficient of kinetic friction between the block and the inclined surface is 0.20. The speed by which the block hits the bottom (point B) is:

A) 6.6 m/s
B) 11 m/s
C) 0.0 m/s
D) 2.0 m/s
E) 13 m/s



Answer A

6-1 Friction
M1-061

An 8.0 kg block is pushed against a vertical wall by a horizontal force *F* as shown in Fig 7. If the coefficients of friction between the block and the wall are $\mu_s = 0.60$ and $\mu_k = 0.30$ then the minimum value for (*F*) that will prevent the block from slipping is:

A) 87 N
B) 260 N
C) 78 N
D) 130 N
E) 24 N

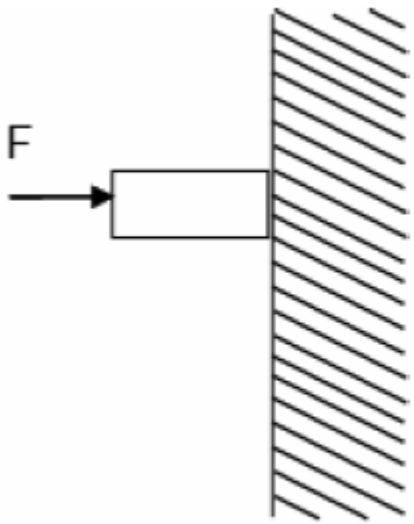


Figure 7

Answer D

6-1 Friction
M1-042

A worker drags a crate across a factory floor by pulling on a rope tied to the crate as shown in Fig.5. The worker exerts a force of 500 N on the rope, which is inclined at 30 degrees to the horizontal, and the floor exerts a frictional force of 150 N. Calculate the magnitude of the acceleration of the crate if its weight is 310 N.

A) 6.0 m/s^2
B) 8.9 m/s^2
C) 7.0 m/s^2
D) 2.0 m/s^2
E) 12 m/s^2

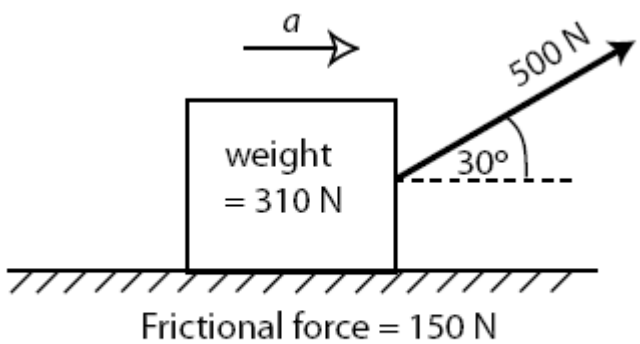


Figure 5

Answer B

6-1 Friction
M1-042

In Fig. 6 a 100 kg block is pushed at a constant speed up the rough 37 degrees ramp by a horizontal force F. The coefficient of kinetic friction between block and surface is 0.15. What is the magnitude of force F?

A) 998 N
B) 660 N
C) 450 N
D) 570 N
E) 1850 N

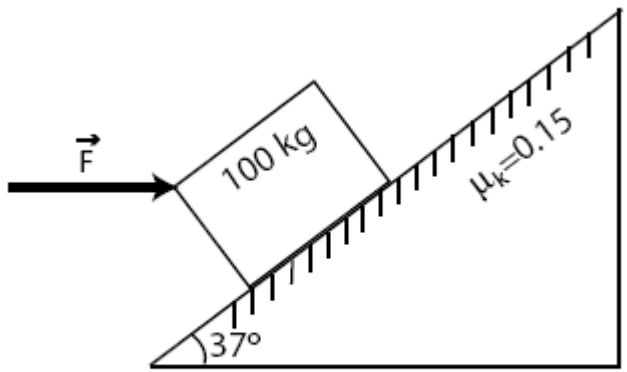


Figure 6

Answer A

6-1 Friction
M1-042

A block (m1= 3.0 kg) on a rough horizontal plane is connected to a second block (m2=5.0 kg) by a cord over a massless pulley. Calculate the coefficient of kinetic friction between the block m1 and the table if the acceleration of the descending block m2 is 4.3 m/s2 (see Fig 7.)

A) 0.75
B) 0.25
C) 0.35
D) 0.50
E) 0.65

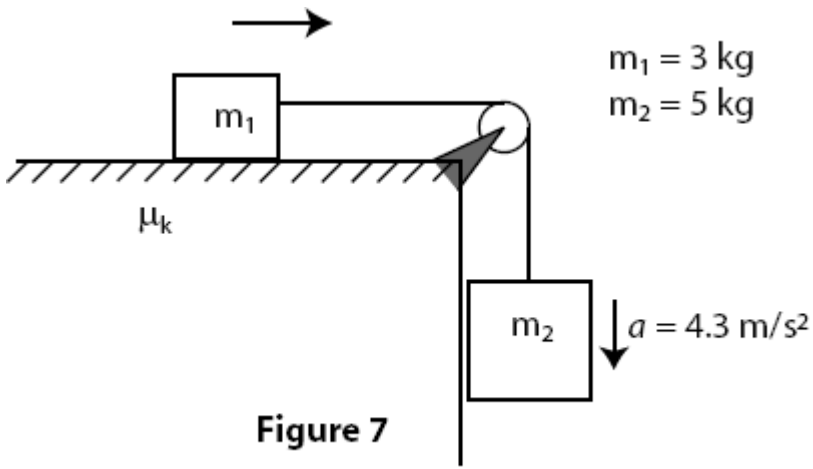


Figure 7

Answer D

6-1 Friction
M1-041

A box with a weight of 50 N rests on a rough horizontal surface (μ_s = 0.4). Two forces F1 (=10 N) and F2 act on the box as shown in Fig 5. What is the smallest vertical force F2 for which the box just starts sliding horizontally?

A) 35 N
B) 10 N
C) 14 N
D) 5.0 N
E) 25 N

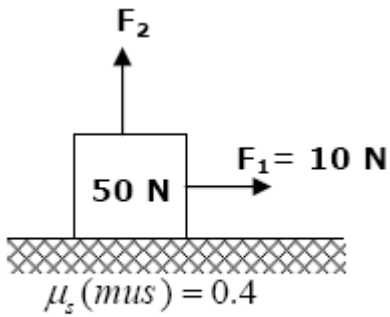


Figure 5

Answer E

6-1 Friction
M1-041

A 400-N block is pushed along a rough horizontal surface (muk = 0.25) by an applied force F as shown in Fig 6. The block moves at constant velocity. The magnitude of F is :

A) 101 N
B) 152 N
C) 83 N
D) 294 N
E) 405 N

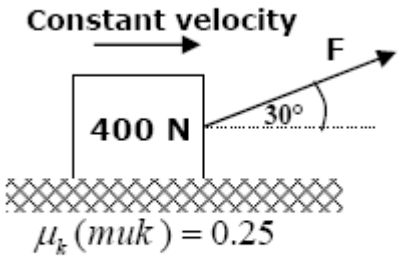


Figure 6

Answer A

6-2 Uniform Circular Motion
M1-062

A 500 kg car moves in a vertical roller coaster of radius 10.0 m at a constant speed of 18.0 m/s (see Fig. 2). The magnitude of the force exerted by the track on the car at the bottom of the circle is:

A) 2.11×10^4 N
B) 6.80×10^4 N
C) 1.13×10^4 N
D) 3.47×10^4 N
E) 5.19×10^4 N

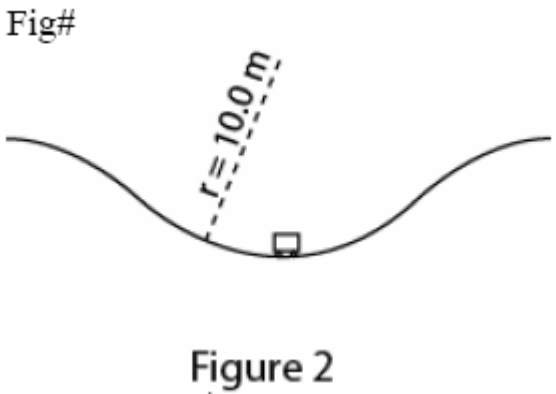


Figure 2

Answer A

6-2 Uniform Circular Motion
M1-062

A car takes a round turn on a flat circular track at a speed of 8.00 m/s. The coefficient of static friction between its tires and the track is 0.300. If the car is at the verge of slipping out of the track at this speed, the radius of the track is:

A) 60.0 m
B) 21.8 m
C) 19.0 m
D) 2.57 m
E) 7.50 m

Answer B

6-2 Uniform Circular Motion
M1-061

A 1000 kg car moves on a level horizontal circular road of radius 50 m. The coefficient of static friction between the tires and the road is 0.50. The maximum speed with which this car can round this curve without slipping is:

A) 9.8 m/s
B) 4.9 m/s
C) 16 m/s
D) 3.0 m/s
E) 12 m/s

Answer C

M1-042

A car is rounding a flat curve of radius R=220 m with speed v = 94 km/h. What is the magnitude of the force exerted by the seat on the passenger whose mass m is 85 kg.

A) 455 N
B) 325 N
C) 263 N
D) 650 N
E) 100 N

Answer C

6-2 Uniform Circular Motion
M1-042

An object moving in a circle at constant speed:

A) has a constant acceleration.
B) has an acceleration of constant magnitude.
C) has a constant velocity .
D) is held to its path by centrifugal force (a force directed away from the center .)
E) has an acceleration that is tangent to the circle.

Answer B

6-2 Uniform Circular Motion
M1-042

Acceleration is always in the direction:

A) of the net force .
B) of the initial velocity .
C) of the final velocity.
D) of the displacement.
E) opposite to the frictional force.

Answer A

6-2 Uniform Circular Motion
M1-041

One end of a 1.0-m long string is fixed, the other end is attached to a 2.0-kg stone. The stone swings in a vertical circle, passing the lowest point at 4.0 m/s (see Fig 7). The tension force (T) of the string at this point is:

A) 0 N
B) 12 N
C) 20 N
D) 32 N
E) 52 N

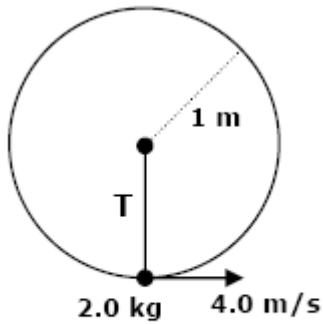


Figure 7

Answer E