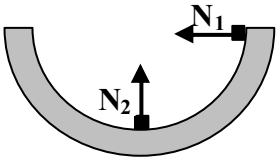
1. A student wants to determine the coefficients of static friction and kinetic friction between a box and a plank. She places the box on the plank and gradually raises one end of the plank. When the angle of inclination with the horizontal reaches 27.5°, the box starts to slip and slides down the plank in 4.1 s. The coefficient of static friction is: 35/4

A. 0.425
B. 0.462
C. 0.479
D. 0.521
E. 0.887

2. A trunk with a weight of 250 N rests on the floor. The coefficient of static friction between the trunk and the floor is 0.42, while the coefficient of kinetic friction is 0.20. If the trunk is pushed with the minimum force required to start the trunk moving and continues to be pushed with this force, how far will the trunk have moved after 5 s? 35/6

A. 25.7 m
B. 2.5 m
C. 24.5 m
D. 2.75 m
E. 27 m

3. A small block of mass M is released at rest from the inner edge of a frictionless, stationary, semicircular bowl and slides down. What can you say about the normal force $|N_1|$ on the block just after it is released and the normal force $|N_2|$ on the block when it is at its lowest point? 37/17



A. $|N_1| < Mg$ and $|N_2| = Mg$
B. $|N_1| = Mg$ and $|N_2| > Mg$
C. $|N_1| < Mg$ and $|N_2| < Mg$
D. $|N_1| < Mg$ and $|N_2| > Mg$
E. $|N_1| > Mg$ and $|N_2| = Mg$

4. At time $t = 0$ a 2 kg particle has a velocity of (4 m/s) $\hat{i}$ - (3 m/s) $\hat{j}$. At $t =$ 3s its velocity is $(2\ m/s)\hat{i} + (3\ m/s)\hat{j}$. During this time the total work done on it was: 43/4

A. -40 J
B. -12 J
C. -4 J
D. 4 J
E. (4J) $\hat{i}$ + (36 J) $\hat{j}$

5. A woman lifts a barbell 2.0 m in 5.0 s. If she lifts it the same distance in 10 s, the work done by her is: 40/12

A. one-fourth as great
B. one-half as great
C. the same
D. two times as great
E. four times as great

6. A 100 kg hockey player skates at 2.5 m/s toward a railing at the edge of the ice and then stops himself by grasping the railing with his outstretched arms. During the stopping process his center of mass moves 40 cm toward the railing. What average force must he exert on the railing? 40/10

A. 7.8 N
B. 15.6 N
C. 781 N
D. 1562 N
E. 3125 N

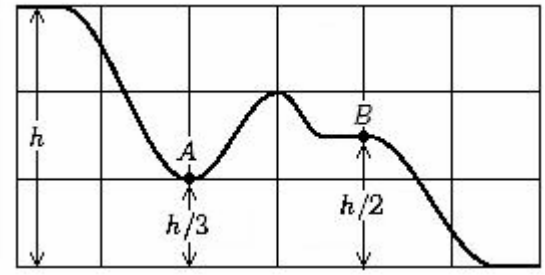
7. A Physics 211 student watches a maple leaf gently fall from a tree on a calm autumn day. The leaf is falling at constant speed, and she draws the following conclusions. Which, if any, are TRUE? 47/8
i) The net force on the leaf is zero.
ii) The work done by air resistance has the same magnitude as the work done by gravity.
iii) The mechanical energy K+U is a constant during the fall of the leaf.
iv) The work done by air resistance on the leaf is negative.

A. iii) and iv) only
B. i) and ii) only
C. i), ii), and iv) only
D. i), ii) and iii) only
E. all four statements are true

8. A large block of cheese, attached securely to a bungee cord, is released from rest from a stationary helicopter. The helicopter is 50 meters above the ground. The bungee cord has an unstretched length of 20 meters and a spring constant of 50 Newtons per meter. The mass of the cheese is 100 kg. Unfortunately the helicopter is too low and the cheese hits the ground. With approximately what velocity does it hit the ground? 48/4

A. 0 m/s
B. 16 m/s
C. 24 m/s
D. 32 m/s
E. 50 m/s

9. An object of mass *m* slides without rolling down the frictionless fun-slide depicted in the figure. If the object begins sliding from rest at the top of slide, what is the ratio of the speed of the object at *B* to the speed of the object at *A*? 48/16

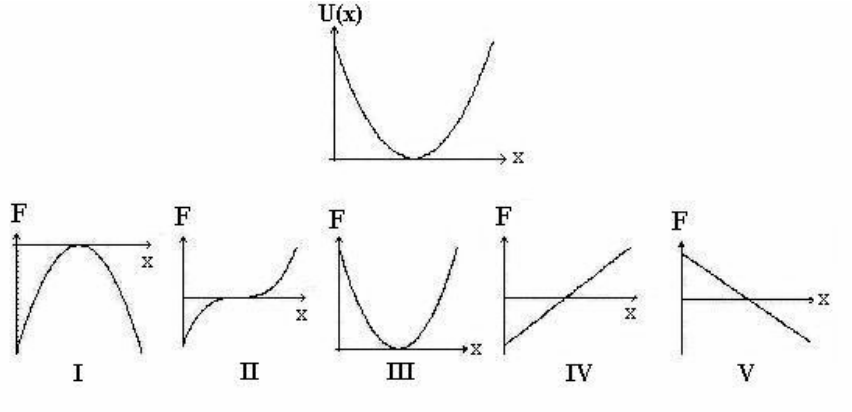


A. 2 to 1
B. $\sqrt{2}$ to 1
C. 3 to 2
D. $\sqrt{3}$ to 2
E. 3 to 4

10. A 1 kg ball is loaded into a spring gun with a spring constant of 10^5 kg/s^2. If the spring is compressed by 10 cm and the ball is shot up vertically, how high does it rise into the air? 48/19

A. 12.7 cm
B. 1.3 m
C. 12.7 m
D. 102.0 m
E. 51.0 m

11. The first graph below shows the potential energy, $U(x)$ for a particle moving along the x axis. Which of the following five graphs correctly gives the force $F(x)$ exerted on the particle? 49/3



A. I
B. II
C. III
D. IV
E. V

12. A 25 kg bear slides, from rest, 8m down a lodgepole pine tree, moving with a speed of 5.7 m/s just before hitting the ground. What is the average frictional force that acts on the bear? 51/2

A. 0 N
B. 195 N
C. 780 N
D. 1550 N
E. 2450 N

13. Superman (mass = 78.0 kg) stops a train (mass = 18619 kg) headed for a broken bridge. The train was initially traveling at 60.0 km/h. During the constant deceleration, the passengers experience an average horizontal force of 0.410 their own weight. How long does it take for the train to come to a stop? 61/12

A. 14.93 s
B. 6.12 s
C. 1.70 s
D. 57.55 s
E. 4.15 s

14. A 2 kg particle traveling with a speed of 2.5 m/s as shown is acted on by a force that changes its velocity. The final velocity is 1 m/s in the opposite direction. If +v is to the right, what is the impulse given to the block (in kg m/s)? 61/5

A. 5.0
B. 7.0
C. 3.0
D. -7
E. 0

15. Daniella and ChiChi stand on a frictionless cart on one side of the room while Austin stands on a second frictionless cart on the opposite side of the room. Both carts are initially at rest, and a long rope is strewn between them. The girls pull as hard as they can on the rope, while Austin merely holds on to his end. A short while later the carts collide. Which of the following must be true? 57/11

A. Austin's cart would have moved a greater distance if he'd been the one pulling on the rope.
B. Daniella & ChiChi's cart would have moved a greater distance if Austin had been the one pulling on the rope.
C. The point of collision will be halfway between the initial separation.
D. The point of collision depends upon who pulls the rope.
E. The point of collision will be the location of center of mass of the system.

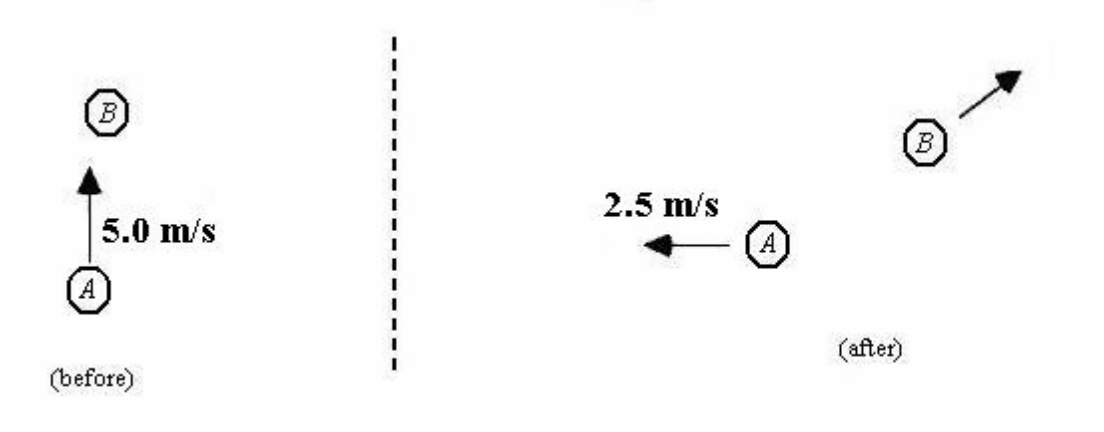
16. A tomato and a tennis ball of the same diameter are dropped on the floor from a height h. The tennis ball bounces higher because: 63/6

A. Momentum is not conserved when the tomato hits the floor.
B. Energy is lost to distortion of the tomato on impact.
C. Momentum is not conserved when the tennis ball hits the floor.
D. There is much more air resistance against the tomato while it is falling.
E. There is a higher coefficient of friction between the tomato and the floor.

17. A hawk and a quail ($m_{hawk} > m_{quail}$) are moving directly toward each other. The birds collide and stick together (via the hawk's talons). Which of the following is true concerning this collision? 63/8

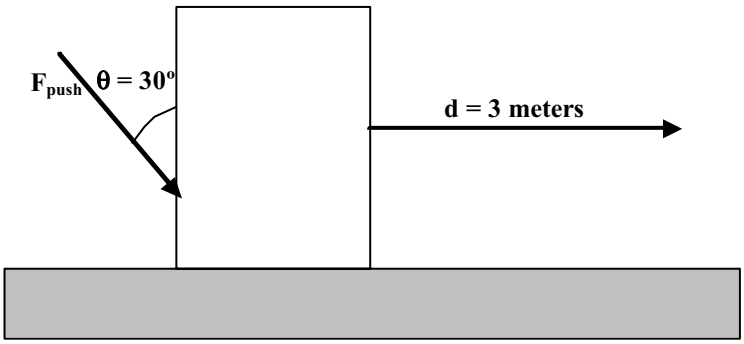
A. The <u>total</u> kinetic energy of the two birds after the collision is the same as before.
B. The center of mass of the two birds moves with the same velocity after the collision as before.
C. The <u>total</u> linear momentum of the two birds is reduced in magnitude by the collision.
D. The magnitude of the impulse on the quail is larger than that on the hawk.
E. The magnitude of the impulse on the hawk is larger than that on the quail.

18. A 2 kg block A traveling with a speed of 5 m/s as shown collides with a stationary 4 kg block B. After the collision, A is observed to travel at right angles with respect to the initial direction with a speed of 2.5 m/s. What is the **magnitude** of the impulse given to B by A (in kg m/s)? 65/3



A. 4.0
B. 11.2
C. 16.3
D. 25
E. 0

19. A constant pushing force of F_{push} = 6 Newtons is applied to a box on a frictional horizontal surface as shown in the figure. If the box is moving with constant velocity for a distance of 3 meters, what can be said about the work done by friction and the work done by the pushing force ($W_{friction}$ and W_{push}) during that motion? 40/16



A. $W_{friction}$ = 9 N and W_{push} = 9 N
B. $W_{friction}$ = -9 N and W_{push} = 9 N
C. $W_{friction}$ = -15.6 N and W_{push} = 15.6 N
D. $W_{friction}$ = -18 N and W_{push} = 18 N
E. $W_{friction}$ = 15.6 N and W_{push} = 15.6 N

Answer Key for Test "P211FA04MT2.tst", 10/25/2004

No. in Q-Bank		No. on Test	Correct Answer
35	4	1	D
35	6	2	E
37	17	3	D
43	4	4	B
40	12	5	C
40	10	6	C
47	8	7	?
48	4	8	C
48	16	9	D
48	19	10	E
49	3	11	C
51	2	12	B
61	12	13	E
61	5	14	B
57	11	15	E
63	6	16	B
63	8	17	B
65	3	18	B
40	16	19	B