

1. A fan, rotating at a constant speed, completes 1200 revolutions every minute. Consider a point on the tip of a blade, at a radius of 0.10 m. What is the magnitude of its acceleration?
 - A. 1256 m/s^2
 - B. 1117 m/s^2
 - C. 783 m/s^2
 - D. 2234 m/s^2
 - E. 1580 m/s^2

2. A ball rolls horizontally off the edge of a table that is 1.5 m high. It strikes the floor at a time t later. What is t ?
 - A. 0.39 s
 - B. You cannot tell without knowing its initial horizontal velocity.
 - C. 0.45 s
 - D. 0.27 s
 - E. 0.55 s

3. Vector \vec{C} has magnitude 12. If you are told that \vec{C} is the sum of vectors \vec{A} and \vec{B} , in other words $\vec{C} = \vec{A} + \vec{B}$, and that vector \vec{A} has magnitude 6, you can then say that vector \vec{B} :
 - A. must be perpendicular to A.
 - B. must have a magnitude of at least 6 but no more than 18.
 - C. cannot have a magnitude greater than 12.
 - D. may have a magnitude of 20.
 - E. must be perpendicular to C.

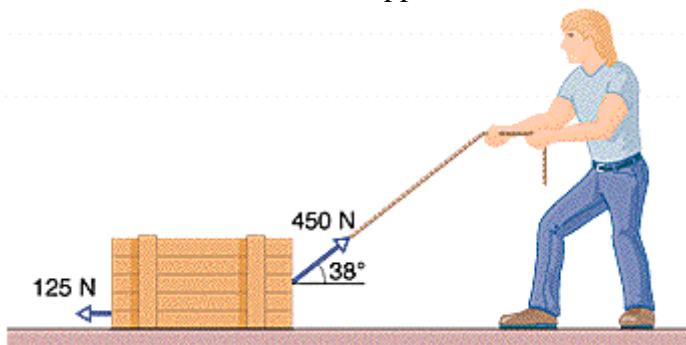
4. A stone is tied to a 0.50 m string and whirled at a constant speed of 4.0 m/s in a vertical circle by a student standing on the surface of the earth. Its acceleration in m/s^2 at the bottom of the circle is most nearly:
- A. 9.8, up
 - B. 32, up
 - C. 8.0, down
 - D. 32, down
 - E. 9.8, down
5. A 1.5 kg mass has an acceleration of $(4.0\hat{i} - 3.0\hat{j}) \text{ m/s}^2$. Only two forces act on the mass. If one of the forces is $(2.0\hat{i} - 1.4\hat{j}) \text{ N}$, what is the magnitude of the other force?
- A. 8.1 N
 - B. 5.1 N
 - C. 4.1 N
 - D. 6.1 N
 - E. 7.1 N
6. A stone is thrown vertically upward at a speed of 16 m/s at time $t = 0$. A second stone is thrown upward with the same speed 1 second later. At what time are the two stones at the same height?
- A. 4.13 s
 - B. 1.13 s
 - C. 0.13 s
 - D. 3.13 s
 - E. 2.13 s

7. Identical guns fire identical bullets horizontally at the same speed from the same height above level planes, one on the Earth and one on the Moon. Which of the following three statements is/are true if we ignore air resistance? Hint: The acceleration due to gravity is smaller on the Moon.

- I. The horizontal distance traveled by the bullet is greater for the Moon.
- II. The flight time is less for the bullet on the Earth.
- III. The velocity of the bullets at impact are the same.

- A. I and II only
- B. II and III only
- C. III only
- D. I, II, III
- E. I and III only

8. A worker drags a crate weighing 311N across a factory floor by pulling on a rope tied to the crate. The worker exerts a force of 450 N on the rope, which is inclined at 38° to the horizontal, and the floor exerts a horizontal force of 125 N that opposes the motion. The acceleration of the crate is approximately:

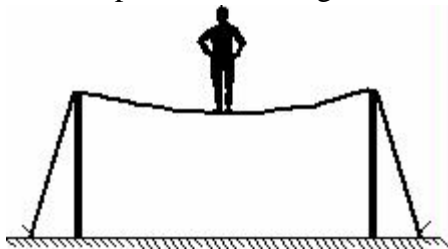


- A. 1.62 m/s^2
- B. 2.48 m/s^2
- C. 7.24 m/s^2
- D. 1.1 m/s^2
- E. 0.49 m/s^2

9. Two footballs A and B are kicked from a field line at an angle of 15° from the horizontal. Ball A has initial speed V , and ball B has initial speed $2V$. If ball A travels a distance D before hitting the ground, then the distance travelled by ball B is:

- A. $D/2$
- B. $D/4$
- C. $4D$
- D. D
- E. $2D$

10. A circus performer of weight W is walking along a "high wire" as shown. The tension in the wire is:



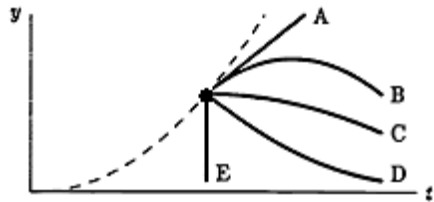
- A. approximately $W/2$.
- B. much less than W .
- C. approximately W .
- D. does not depend at all on W .
- E. much more than W .

11. A 2.29 kg mass is suspended from a string which is pulled upward. The mass accelerates upwards with an acceleration of 2.30 m/s^2 . The tension in the string is:
- A. 5.27 N
 - B. 22.44 N
 - C. 17.17 N
 - D. 27.71 N
 - E. 12.10 N
12. In the 1991 World Track and Field Championships in Tokyo, Mike Powell jumped 8.95m, breaking the 23-year long-jump record set by Bob Beamon by a full 5cm. Assume that Powell's speed on take off was 9.5 m/s (about equal to that of a sprinter) and that $g = 9.80 \text{ m/s}^2$ in Tokyo. How close did Powell come to the maximum possible range in the absence of air resistance?



- A. 0.78 m
- B. 0.26 m
- C. 0.33 m
- D. 0 m
- E. 0.52 m

13. An elevator is moving upwards with a constant acceleration. The dashed curve in the figure shows the position y of the ceiling of the elevator as a function of time t . At the instant indicated by the dot, a bolt breaks loose and drops from the ceiling. Which curve best represents the position of the bolt as a function of time as viewed by a stationary observer?



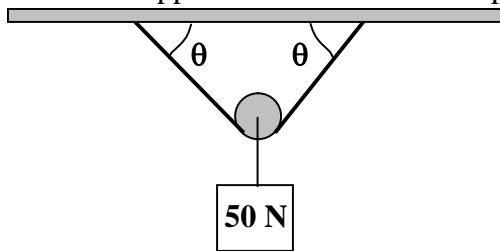
- A. A
- B. B
- C. C
- D. D
- E. E

14. A block of mass 4.0 kg lies on a frictionless horizontal table in contact with a 6.0 kg block. At the opposite side of the 4.0 kg block, a constant horizontal force of 100.0 N is applied as shown in the diagram. What is the magnitude of the horizontal force on the 6.0 kg block?



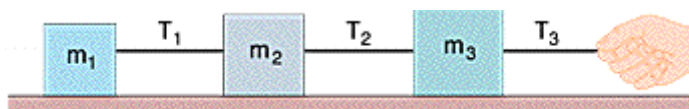
- A. 60 N
- B. 150 N
- C. 100 N
- D. 40 N
- E. 0 N

15. A length of massless rope is tied at both ends to the ceiling. The rope runs under a frictionless, massless pulley as shown with $\theta = 45^\circ$. A block of weight 50 N hangs from the pulley. If nothing in this situation is moving, what is the approximate tension in the rope?



- A. 35 N
B. 86 N
C. 50 N
D. 25 N
E. 71 N
16. If $\vec{a} = 3\hat{i} - 4\hat{j}$ and $\vec{b} = 4\hat{i} - 3\hat{j}$, what is the magnitude of the vector $\vec{a} - \vec{b}$?
- A. 10
B. 2
C. 5
D. 1.4
E. 0

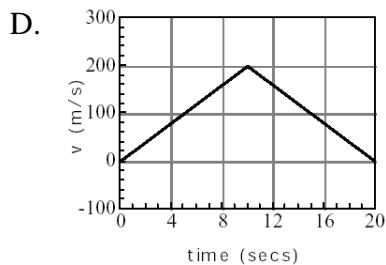
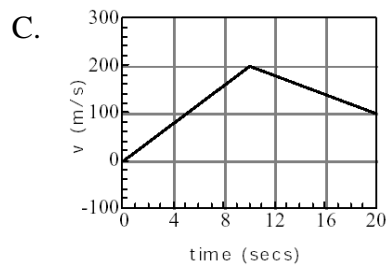
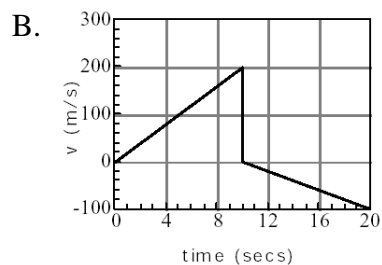
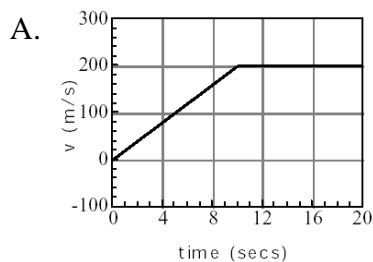
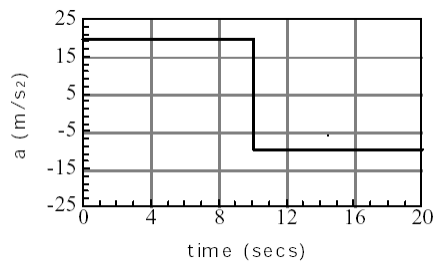
17. Three blocks are connected, as shown in the figure, on a horizontal frictionless table and pulled to the right with a force $T_3 = 64.2$ N. If $m_1 = 11.3$ kg, $m_2 = 23.7$ kg, and $m_3 = 32.6$ kg, the tension T_1 is



- A. 22.25 N
B. 0.949 N
C. 10.7 N
D. 33.2 N
E. 67.6 N
18. A pickup truck is moving horizontally with a speed of 15 m/s. A rider sitting in the back throws a ball such that in the rider's reference frame it has an initial velocity which is vertical with magnitude 20 m/s. In the reference frame of a stationary observer on the ground:
- A. The ball's initial velocity is straight up in the air.
B. The direction of the ball's initial velocity is less than 45 degrees above the horizontal.
C. The ball's initial speed is 25 m/s.
D. The ball's initial speed is 35 m/s.
E. The ball's initial speed is 15 m/s.

19. Two vectors have magnitudes of 11 and 14. The angle between them when they are drawn with their tails at the same point is 55° . The component of the longer vector along the line of the shorter is approximately:
- A. 0
 - B. 6.3
 - C. 9.0
 - D. 14
 - E. 8.0

20. The plot below shows the acceleration versus time for a particle. Which of the plots of velocity versus time corresponds to this acceleration?



Answer Key for Test "P211FA04MT1.tst", 2/14/2005

No. in Q-Bank	No. on Test	Correct Answer
23	1	E
22	5	E
14	2	B
23	5	B
30	1	B
9	13	E
22	15	A
33	1	C
22	1	C
31	10	E
33	5	D
22	21	B
6	9	B
33	6	A
33	25	A
12	6	D
33	3	C
25	5	C
12	3	E
6	2	C