1. A car traveling on a straight road at 15.0 meters per second accelerates uniformly to a speed of 21.0 meters per second in 12.0 seconds. The total distance traveled by the car in this 12.0-second time interval is

   A) 36.0 m B) 180. m
   C) 216 m D) 252 m

2. A baseball player runs 27.4 meters from the batter's box to first base, overruns first base by 3.0 meters, and then returns to first base. Compared to the total distance traveled by the player, the magnitude of the player's total displacement from the batter's box is

   A) 3.0 m shorter B) 6.0 m shorter
   C) 3.0 m longer D) 6.0 m longer

3. A blinking light of constant period is situated on a lab cart. Which diagram best represents a photograph of the light as the cart moves with constant velocity?

   A)
   B)
   C)
   D)

4. Base your answer to the following question on the information below.

   A 1,000-kilogram car traveling with a velocity of +20. meters per second decelerates uniformly at –5.0 meters per second^2 until it comes to rest.

   What is the total distance the car travels as it decelerates to rest?

   A) 10. m B) 20. m
   C) 40. m D) 80. m

5. Starting from rest, an object rolls freely down an incline that is 10 meters long in 2 seconds. The acceleration of the object is approximately

   A) 5 m/sec B) 5 m/sec^2
   C) 10 m/sec D) 10 m/sec^2

6. An object accelerates uniformly from rest to a speed of 50. meters per second in 5.0 seconds. The average speed of the object during the 5.0-second interval is

   A) 5.0 m/s B) 10. m/s
   C) 25 m/s D) 50. m/s

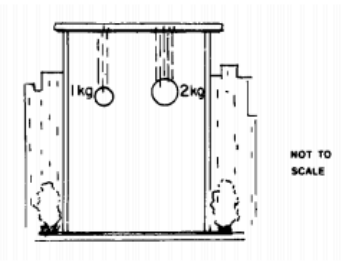
7. A child riding a bicycle at 15 meters per second decelerates at the rate of 3.0 meters per second^2 for 4.0 seconds. What is the child's speed at the end of the 4.0 seconds?

   A) 12 m/s B) 27 m/s
   C) 3.0 m/s D) 7.0 m/s

8. A rock is dropped from a bridge. What happens to the magnitude of the acceleration and the speed of the rock as it falls? [Neglect friction.]

   A) Both acceleration and speed increase.
   B) Both acceleration and speed remain the same.
   C) Acceleration increases and speed decreases.
   D) Acceleration remains the same and speed increases.

9. Base your answer to the following question on the diagram below which shows a 1-kilogram mass and a 2-kilogram mass being dropped from a building 100 meters high.



   Halfway down, the acceleration is

   A) greater for the 1-kilogram mass
   B) greater for the 2-kilogram mass
   C) the same for both masses

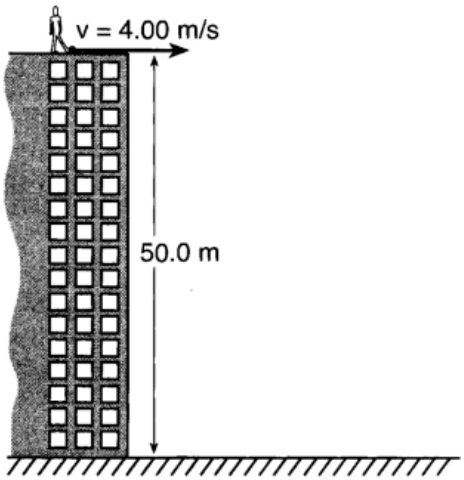
10. A ball is thrown vertically upward with an initial velocity of 29.4 meters per second. What is the maximum height reached by the ball? [Neglect friction.]

A) 14.7 m B) 29.4 m
C) 44.1 m D) 88.1 m

11. A rock falls from rest a vertical distance of 0.72 meter to the surface of a planet in 0.63 second. The magnitude of the acceleration due to gravity on the planet is

A) 1.1 m/s^2 B) 2.3 m/s^2
C) 3.6 m/s^2 D) 9.8 m/s^2

12. As shown in the diagram below, a student standing on the roof of a 50.0-meter-high building kicks a stone at a horizontal speed of 4.00 meters per second.



(Not drawn to scale)

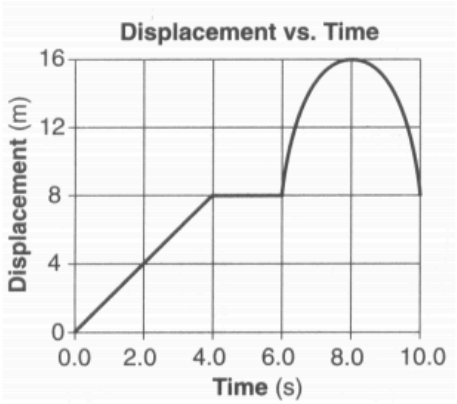
How much time is required for the stone to reach the level ground below? [Neglect friction.]

A) 3.19 s B) 5.10 s
C) 10.2 s D) 12.5 s

13. A ball is thrown horizontally at a speed of 24 meters per second from the top of a cliff. If the ball hits the ground 4.0 seconds later, approximately how high is the cliff?

A) 6.0 m B) 39 m
C) 78 m D) 96 m

14. The graph below represents the displacement of an object moving in a straight line as a function of time.

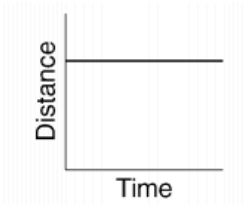


What was the total displacement traveled by the object during the 10.0-second time interval?

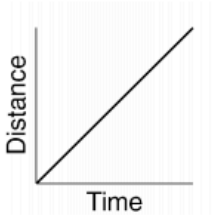
A) 0 m B) 8 m
C) 16 m D) 24 m

15. Which graph best represents the motion of a block accelerating uniformly down an inclined plane?

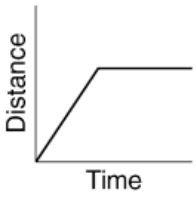
A)



B)

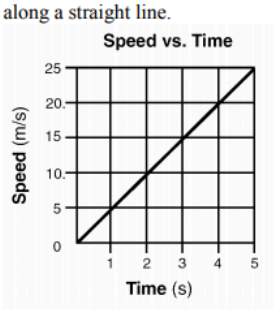


C)



D)

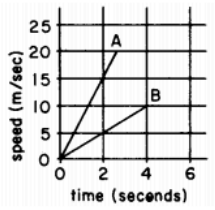
16. The graph below represents the relationship between speed and time for an object moving along a straight line.



What is the total distance traveled by the object during the first 4 seconds?

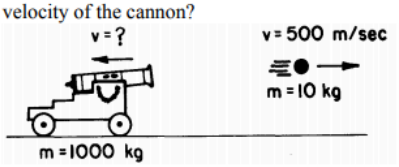
A) 5 m B) 20 m
C) 40 m D) 80 m

17. The graph below shows the relationship between speed and time for two objects, *A* and *B*. Compared with the acceleration of object *B*, the acceleration of object *A* is



A) one-third as great
B) twice as great
C) three times as great
D) the same

18. In the diagram below, a 10-kilogram ball is fired with a velocity of 500 meters per second from a 1,000-kilogram cannon. What is the recoil velocity of the cannon?



A) 5 m/s B) 2 m/s
C) 10 m/s D) 500 m/s

19. A 5-newton ball and a 10-newton ball are released simultaneously from a point 50 meters above the surface of the Earth. Neglecting air resistance, which statement is true?

A) The 5-N ball will have a greater acceleration than the 10-N ball.
B) The 10-N ball will have a greater acceleration than the 5-N ball.
C) At the end of 3 seconds of free-fall, the 10-N ball will have a greater momentum than the 5-N ball.
D) At the end of 3 seconds of free-fall, the 5-N ball will have a greater momentum than the 10-N ball.

20. A force of 6.0 newtons changes the momentum of a moving object by 3.0 kilogram•meters per second. How long did the force act on the mass?

A) 1.0 s B) 2.0 s
C) 0.25 s D) 0.50 s

21. A 5.0-kilogram cart moving with a velocity of 4.0 meters per second is brought to a stop in 2.0 seconds. The magnitude of the average force used to stop the cart is

A) 20. N B) 2.0 N
C) 10. N D) 4.0 N

22. When a 1.0-kilogram cart moving with a speed of 0.50 meter per second on a horizontal surface collides with a second 1.0-kilogram cart initially at rest, the carts lock together. What is the speed of the combined carts after the collision? [Neglect friction.]

A) 1.0 m/s B) 0.50 m/s
C) 0.25 m/s D) 0 m/s

23. A 750-newton person stands in an elevator that is accelerating upward. The upward force of the elevator floor on the person must be

A) equal to 0 N
B) less than 750 N
C) equal to 750 N
D) greater than 750 N

24. A 0.15 kg baseball moving at +28 m/s is slowed to a stop by a catcher who exerts a constant force of −390 N. How far does the ball travel before stopping?
(a) 0.13 M (b) 1.13 m (c) 3.0 m (d) 4.0 m (E)None

25. Water leaves a hose at a rate of 1.5 kg/s with a speed of 20 m/s and is amid at the side of the car, which stops it. What is the force exerted by the water on the car?
(a) 10 N (b) 20 N (c) 30 N (d) 40 N (E)None

Extra Credit (10 points)
Estimate the average force exerted on your feet by the ground if you (Mass = 70 kg) , with stiff legs, land on the floor after jumping from the desk of Mr. Bari's Table (height = 3 meters). With stiff legs the movement of human body is in average 1 cm during impact.