Physics
Mrs. Jablonowski

Name _____

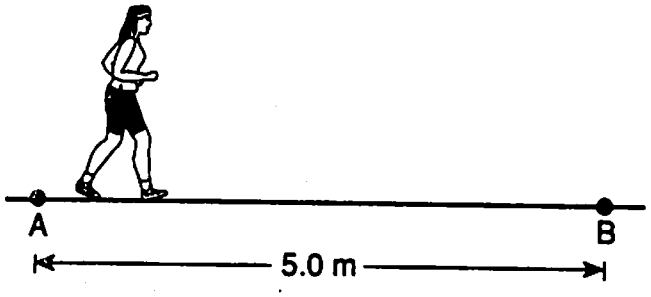
Review

Straight-line Motion #1

1 The thickness of a dollar bill is closest to

(1) 10^{-4} m
(2) 10^{-2} m
(3) 10^{-1} m
(4) 10^{1} m

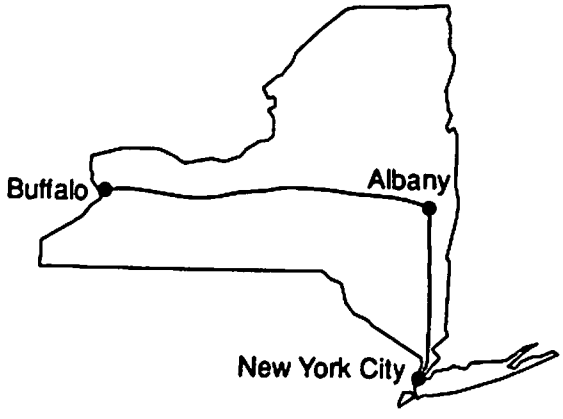
2 A jogger accelerates at a constant rate as she travels 5.0 meters along a straight track from point *A* to point *B*, as shown in the diagram below.



If her speed was 2.0 meters per second at point *A* and will be 3.0 meters per second at point *B*, how long will it take her to go from *A* to *B*?

(1) 1.0 s
(2) 2.0 s
(3) 3.3 s
(4) 4.2 s

3 A car is driven from Buffalo to Albany and on to New York City, as shown in the diagram below.



Compared to the magnitude of the car's total displacement, the distance driven is

1 shorter
2 longer
3 the same

4 Oil drips at 0.4-second intervals from a car that has an oil leak. Which pattern best represents the spacing of oil drops as the car accelerates uniformly from rest?

(1) . . . . . .
(2) . . . .
(3) . . . . . .
(4) . .. .

5 In an experiment that measures how fast a student reacts, a meter stick dropped from rest falls 0.20 meter before the student catches it. The reaction time of the student is approximately

(1) 0.10 s
(2) 0.20 s
(3) 0.30 s
(4) 0.40 s

6 A race car traveling at 10. meters per second accelerates at the rate of 1.5 meters per second^2 while traveling a distance of 600. meters. The final speed of the race car is approximately

(1) 1900 m/s
(2) 910 m/s
(3) 150 m/s
(4) 44 m/s

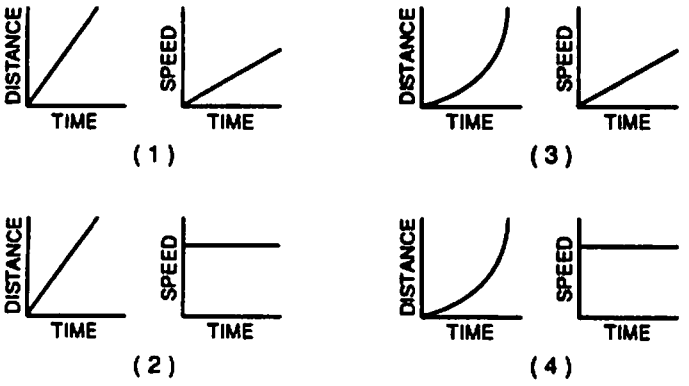
7 A 4.0-kilogram rock and a 1.0-kilogram stone fall freely from rest from a height of 100. meters. After they fall for 2.0 seconds, the ratio of the rock's speed to the stone's speed is

(1) 1:1
(2) 2:1
(3) 1:2
(4) 4:1

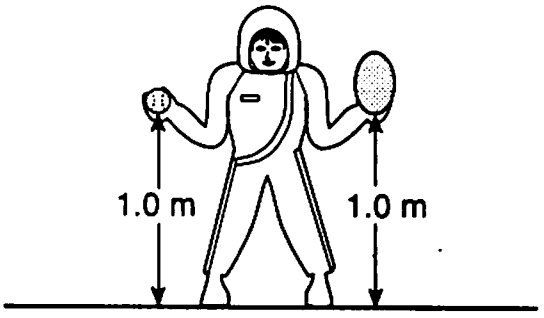
8 An object falls freely from rest near the surface of the Earth. What is the speed of the object when it has fallen 4.9 meters from its rest position?

(1) 4.9 m/s
(2) 9.8 m/s
(3) 24 m/s
(4) 96 m/s

9 Which two graphs represent the motion of an object on which the net force is zero?



10 As shown in the diagram below, an astronaut on the Moon is holding a baseball and a balloon. The astronaut releases both objects at the same time.



What does the astronaut observe? [Note: The Moon has no atmosphere.]

1 The baseball falls slower than the balloon.
2 The baseball falls faster than the balloon.
3 The baseball and balloon fall at the same rate.
4 The baseball and balloon remain suspended and do not fall.

11 A bicyclist accelerates from rest to a speed of 5.0 meters per second in 10. seconds. During the same 10. seconds, a car accelerates from a speed of 22 meters per second to a speed of 27 meters per second. Compared to the acceleration of the bicycle, the acceleration of the car is

1 less
2 greater
3 the same

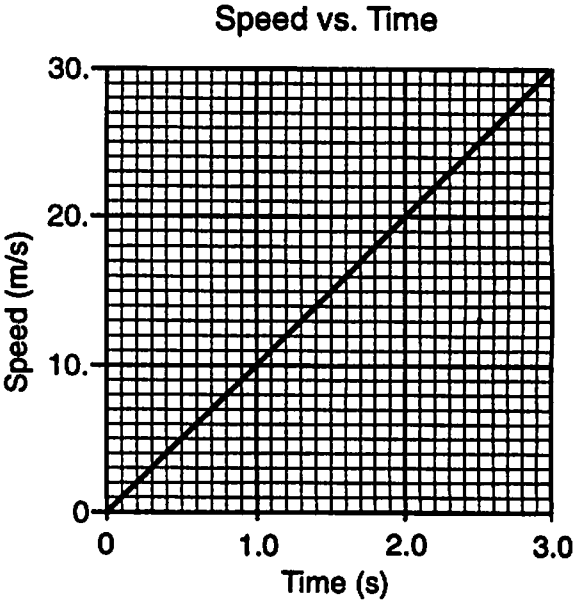
12. A car travels between the 100.-meter and 250.-meter highway markers in 10. seconds. The average speed of the car during this interval is

(1) 10. m/s
(2) 15 m/s
(3) 25 m/s
(4) 35 m/s

13. A student walks 40. meters along a hallway that heads due north, then turns and walks 30. meters along another hallway that heads due east. What is the magnitude of the student's resultant displacement?

(1) 10. m
(2) 35 m
(3) 50. m
(4) 70. m

14. The graph below represents the relationship between speed and time for a car moving in a straight line.



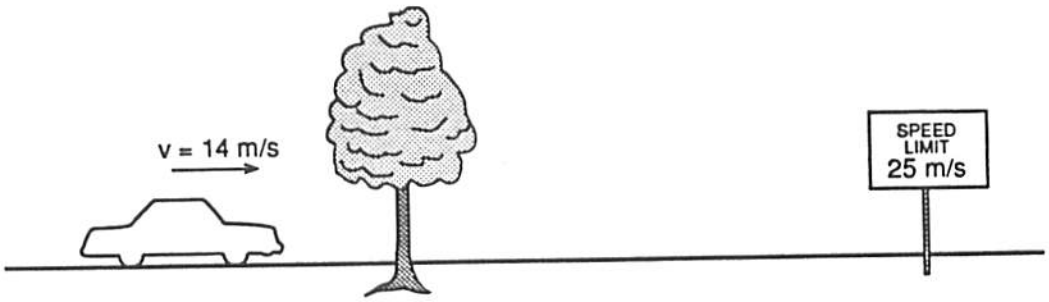
The magnitude of the car's acceleration is

(1) 1.0 m/s^2
(2) 0.10 m/s^2
(3) 10. m/s^2
(4) 0.0 m/s^2

15. A rock falls freely from rest near the surface of a planet where the acceleration due to gravity is 4.0 meters per $second^2$. What is the speed of this rock after it falls 32 meters?

(1) 8.0 m/s
(2) 16 m/s
(3) 25 m/s
(4) 32 m/s

Base your answers to questions 16 and 17 on the information and diagram below.



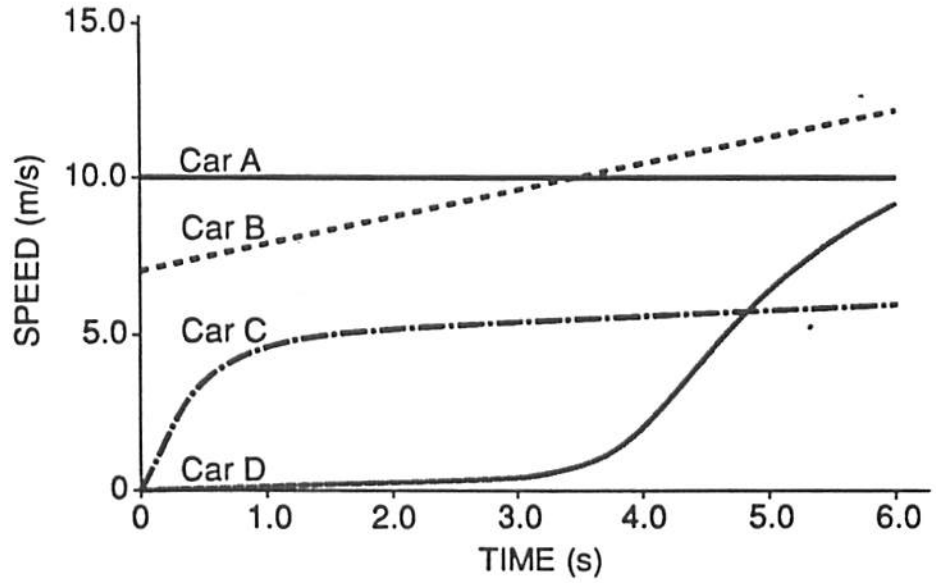
A car is traveling at a constant speed of 14 meters per second along a straight highway. A tree and a speed limit sign are beside the highway. As it passes the tree, the car starts to accelerate. The car is accelerated uniformly at 2.0 meters per second^2 until it reaches the speed limit sign, 5.0 seconds later.

Note that question 16 has only three choices.

16 When the car reaches the sign, the car's speed is
1 less than the speed limit
2 greater than the speed limit
3 equal to the speed limit

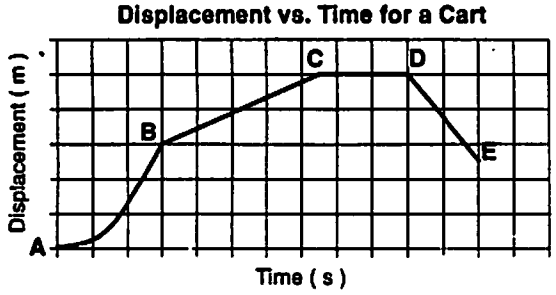
17 What is the distance between the tree and the sign?
(1) 10. m
(2) 25 m
(3) 70. m
(4) 95 m

18 The graph below shows speed as a function of time for four cars, *A*, *B*, *C*, and *D*, in straight-line motion.



Which car experienced the greatest average acceleration during this 6.0-second interval?
1 car *A*
2 car *B*
3 car *C*
4 car *D*

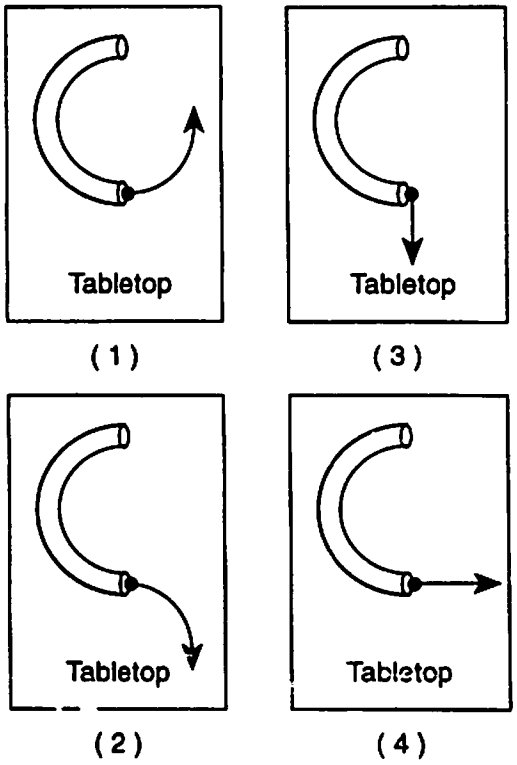
19. The displacement-time graph below represents the motion of a cart along a straight line.



During which interval was the cart accelerating?

(1) *AB* (3) *CD*
(2) *BC* (4) *DE*

20. A ball rolls through a hollow semicircular tube lying flat on a horizontal tabletop. Which diagram best shows the path of the ball after emerging from the tube, as viewed from above?



[2]

Base your answers to questions 21 through 25 on the information below.

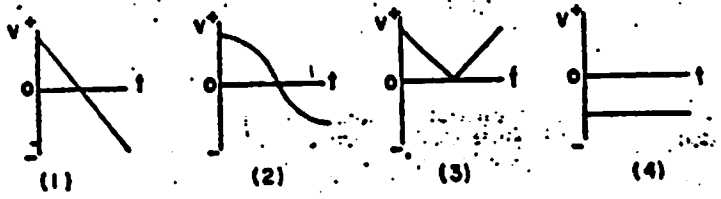
A toy projectile is fired from the ground vertically upward with an initial velocity of +29 meters per second. The projectile arrives at its maximum altitude in 3.0 seconds. [Neglect air resistance.]

21. The greatest height the projectile reaches is approximately
(1) 23 m (3) 87 m
(2) 44 m (4) 260 m

22. What is the velocity of the projectile when it hits the ground?
(1) 0. m/s (3) −29 m/s
(2) −9.8 m/s (4) +29 m/s

23. What is the displacement of the projectile from the time it left the ground until it returned to the ground?
(1) 0. m (3) 44 m
(2) 9.8 m (4) 88 m

24. Which graph best represents the relationship between velocity (v) and time (t) for the projectile?

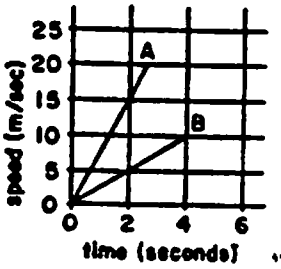


25. As the projectile rises and then falls back to the ground, its acceleration
1 decreases, then increases
2 increases, then decreases
3 increases, only
4 remains the same

26. Acceleration is a vector quantity that represents the time-rate of change in
1 momentum
2 velocity
3 distance
4 energy

27. A moving body must undergo a change of
1 velocity
2 acceleration
3 position
4 direction

28. The graph at the right 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

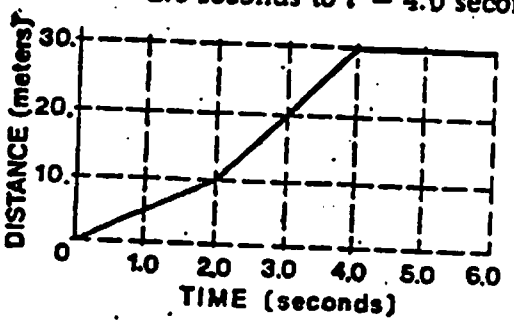


1 one-third as great
2 twice as great
3 three times as great
4 the same

29. Which is a vector quantity?
(1) acceleration due to gravity
(2) mechanical equivalent of heat
(3) rest mass of an electron
(4) speed of an object

30. A rock is thrown horizontally from the top of a cliff at 12 meters per second. Approximately how long does it take the rock to fall 45 meters vertically? [Assume negligible air resistance.]
(1) 1.0 sec
(2) 5.0 sec
(3) 3.0 sec
(4) 8.0 sec

31. The distance-time graph below represents the position of an object moving in a straight line. What is the speed of the object during the time interval $t = 2.0$ seconds to $t = 4.0$ seconds?



(1) 0.0 m/s
(2) 5.0 m/s
(3) 7.5 m/s
(4) 10. m/s

32. The graph at the right represents the motion of a body that is moving with

1 increasing acceleration
2 decreasing acceleration
3 increasing speed
4 constant speed

33. The average speed of a plane was 600 kilometers per hour. How long did it take the plane to travel 120 kilometers?
(1) 0.2 hour
(2) 0.5 hour
(3) 0.7 hour
(4) 5 hours

34. An object initially at rest accelerates at 5 meters per second^2 until it attains a speed of 30 meters per second. What distance does the object move while accelerating?
(1) 30 m
(2) 90 m
(3) 3 m
(4) 600 m

Base your answers to questions 35 through 39 on the information below.

A 10.-kilogram object, starting from rest, slides down a frictionless incline with a constant acceleration of 2.0 m/sec² for 4.0 seconds.

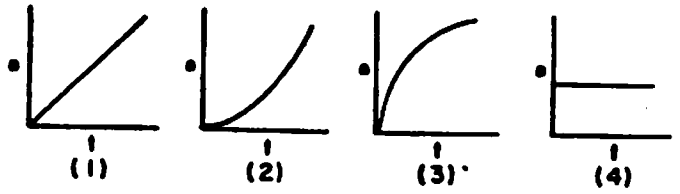
35. What is the velocity of the object at the end of the 4.0 seconds?
(1) 16 m/sec
(2) 2.0 m/sec
(3) 8.0 m/sec
(4) 4.0 m/sec

36. During the 4.0 seconds, the object moves a total distance of
(1) 32 m
(2) 16 m
(3) 8.0 m
(4) 4.0 m

37. To produce this acceleration, what is the force on the object?
(1) 10. newtons
(2) 2.0×10^1 newtons
(3) 5.0 newtons
(4) 2.0×10^2 newtons

38. What is the approximate weight of the object?
(1) 1 newton
(2) 10 newtons
(3) 100 newtons
(4) 1,000 newtons

39. Which graph best represents the relationship between acceleration (a) and time (t) for the object?



40. What is the average speed of an object that travels 6.00 meters north in 2.00 seconds and then travels 3.00 meters east in 1.00 second?
(1) 9.00 m/s
(2) 0.333 m/s
(3) 3.00 m/s
(4) 4.24 m/s

41. A student drops an object from the top of a building which is 19.6 meters from the ground. How long does it take the object to fall to the ground?
(1) 19.6 seconds
(2) 2.00 seconds
(3) 3.00 seconds
(4) 4.00 seconds