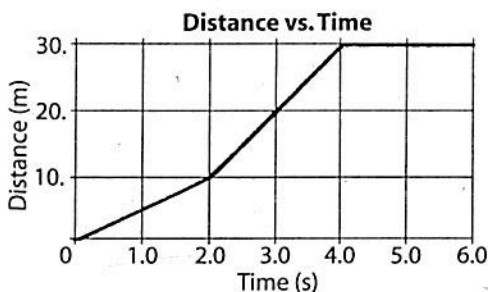


# Review Questions

- If a boy runs 125 meters north, and then 75 meters south, his total displacement is
  50. m north
  50. m south
  200. m north
  200. m south
- A student walks 3 blocks south, 4 blocks west, and 3 blocks north. What is the resultant displacement of the student?
  10. blocks east
  10. blocks west
  - 4 blocks east
  - 4 blocks west
- A girl attempts to swim directly across a stream 15 meters wide. When she reaches the other side, she is 15 meters downstream. Calculate the magnitude of her displacement.
- 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?
  - 9.00 m/s
  - 0.333 m/s
  - 3.00 m/s
  - 4.24 m/s
- In a 4.0-kilometer race, a runner completes the first kilometer in 5.9 minutes, the second kilometer in 6.2 minutes, the third kilometer in 6.3 minutes, and the final kilometer in 6.0 minutes. The average speed of the runner for the race is approximately
  - 0.16 km/min
  - 0.33 km/min
  - 12 km/min
  - 24 km/min
- The graph below shows the relationship between the position of an object moving in a straight line and elapsed time.

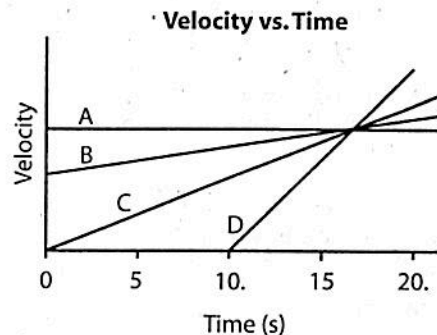


What is the speed of the object during the time interval  $t = 2.0$  seconds to  $t = 4.0$  seconds?

- (1) 0.0 m/s (2) 5.0 m/s (3) 7.5 m/s (4) 10. m/s
- A particle is accelerated uniformly from rest to a speed of 50. meters per second in 5.0 seconds. The average speed of the particle during this 5.0-second time interval is
    - 5.0 m/s
    10. m/s
    - 25 m/s
    50. m/s

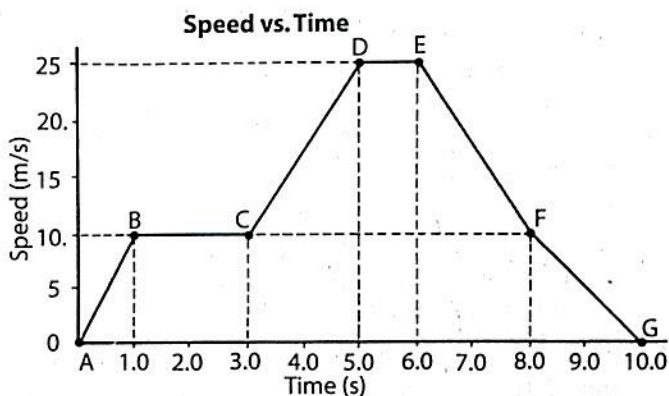
- Which statement best describes the movement of an object with zero acceleration?
  - The object must be at rest.
  - The object must be slowing down.
  - The object may be speeding up.
  - The object may be in motion.
- A particle has a constant acceleration of 2.0 meters per second<sup>2</sup>. Calculate the time required for the particle to accelerate from 8.0 meters per second to 28 meters per second.
- If an object is traveling east with a decreasing speed, the direction of the object's acceleration is
  - north
  - south
  - east
  - west

Base your answers to questions 11 and 12 on the following graph, which represents the relationship between velocity and time of travel for four cars, A, B, C, and D, in straight-line motion.



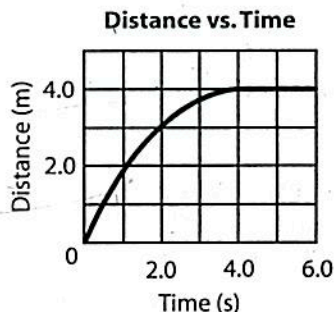
- Which car has the greatest acceleration during the time interval 10. seconds to 15 seconds?
  - Which car travels the greatest distance during the time interval 0 second to 10. seconds?
    - A only
    - B only
    - C only
    - The distance traveled is the same for cars A, B, and C.
- 
- Starting from rest, an object rolls freely down a 10.-meter long incline in 2.0 seconds. The acceleration of the object is
    - 5.0 m/s
    - 5.0 m/s<sup>2</sup>
    10. m/s
    10. m/s<sup>2</sup>
  - A car accelerates uniformly from rest at 3.2 meters per second<sup>2</sup>. Calculate the speed of the car when it has traveled a distance of 40. meters.

Base your answers to questions 15 through 19 on the graph below, which represents the relationship between speed and time for an object in straight-line motion.



15. Calculate the acceleration of the object during the time interval  $t = 3.0$  seconds to  $t = 5.0$  seconds.
16. Determine the average speed of the object during the time interval  $t = 6.0$  seconds to  $t = 8.0$  seconds.
17. Calculate the total distance traveled by the object during the first 3.0 seconds.
18. Identify the interval during which the magnitude of the object's acceleration is greatest.
19. During the interval  $t = 8.0$  seconds to  $t = 10.0$  seconds, the speed of the object is
  - (1) zero
  - (2) increasing
  - (3) decreasing
  - (4) constant, but not zero

20. The graph below represents the relationship between distance and time of travel for an object moving in a straight line.

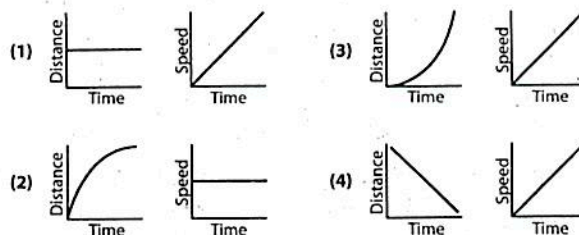


Determine the instantaneous speed of the object at 1.5 seconds.

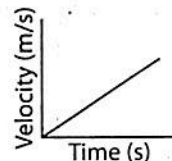
21. A boat heads directly eastward across a river at 12 meters per second. If the current in the river is flowing at 5.0 meters per second due south, what is the magnitude of the boat's resultant velocity?

(1) 7.0 m/s (2) 8.5 m/s (3) 13 m/s (4) 17 m/s

22. Which pair of graphs represents the same motion?



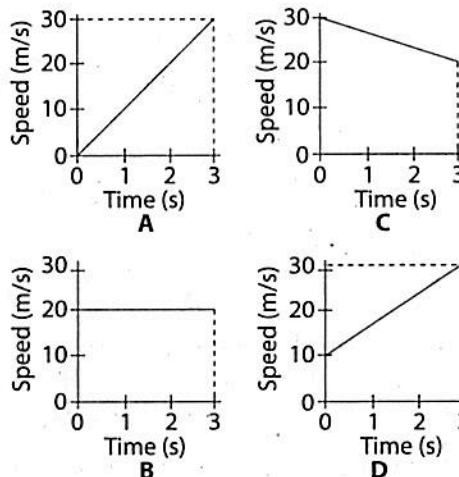
23. The graph below represents the motion of a body moving along a straight line.



Which quantity related to the motion of the body is constant?

- (1) speed
- (2) velocity
- (3) acceleration
- (4) displacement

Base your answers to questions 24 through 28 on the following four graphs, which represent the relationship between speed and time for four different objects, A, B, C, and D moving, in a straight line.



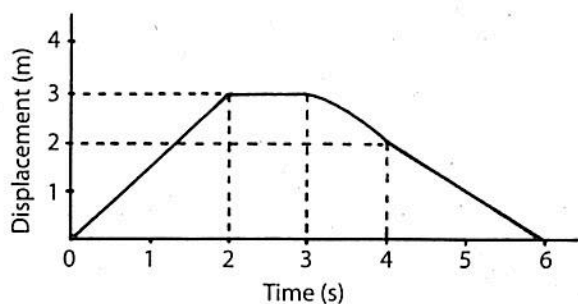
24. Which object had a retarding force acting on it?
25. Which object was *not* accelerating?
26. Which object traveled the greatest distance in the 3.0-second time interval?

27. Which object had the greatest acceleration?
28. Compared to the average speed of object A, the average speed of object D is
- (1) less (3) the same  
(2) greater

29. An object initially traveling at 20. meters per second west accelerates uniformly at 4.0 meters per second<sup>2</sup> east for 2.0 seconds. The displacement of the object during these 2.0 seconds is
- (1) 32 m east (3) 48 m east  
(2) 32 m west (4) 48 m west
30. An object initially traveling at 20. meters per second south accelerates uniformly at 6.0 meters per second<sup>2</sup> north and is displaced 25 meters. The final velocity of the object is
- (1) 26 m/s north (3) 10. m/s north  
(2) 26 m/s south (4) 10. m/s south
31. The time-rate of change of displacement is
- (1) acceleration (3) speed  
(2) distance (4) velocity

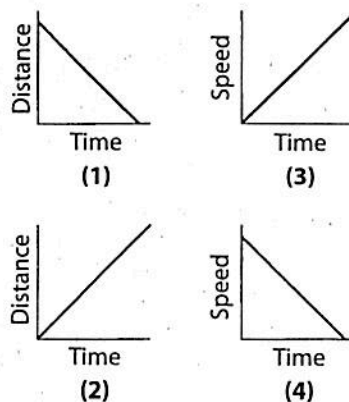
Base your answers to questions 32 through 35 on the following graph, which represents the relationship between the displacement of an object and time.

Displacement vs. Time

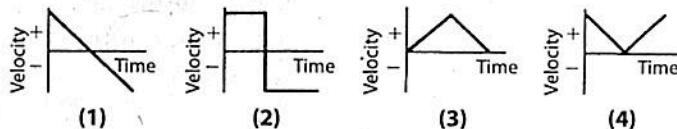


32. How far is the object from the starting point at the end of 3 seconds?
33. During which time interval is the object at rest?

34. What is the average velocity of the object from  $t = 0$  to  $t = 3$  seconds?
- (1) 1 m/s (2) 2 m/s (3) 3 m/s (4) 0 m/s
35. During which time interval is the object accelerating?
36. Which quantity is constant for a freely falling object near Earth's surface?
- (1) displacement (3) velocity  
(2) speed (4) acceleration
37. Which graph best represents the motion of an object falling from rest near Earth's surface? [Neglect friction.]



38. What is the total distance that an object near the surface of Earth falling freely from rest travels in 3.0 seconds?
- (1) 88 m (2) 44 m (3) 29 m (4) 9.8 m
39. An object starts from rest and falls freely near Earth's surface for 3.00 seconds. Calculate the final speed of the object.
40. An object is thrown vertically upward from the surface of Earth. Which graph best represents the relationship between velocity and time for the object as it rises and then returns to Earth?



## Statics

The branch of mechanics that treats forces which act on objects at rest is called statics. A force is a push or pull measured in newtons, N, a derived unit in the SI system. Force is a vector quantity.

## Concurrent Forces

Two or more forces that act on the same object at the same time are called concurrent forces. The single force that is equivalent to the combined effect

