

Questions

Chapter 2

Motion Along a Straight Line

- 2-1 Position and Displacement**
- 2-2 Average Velocity and Average Speed**
- 2-3 Instantaneous Velocity and Speed**
- 2-4 Acceleration**
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2-1 Position and Displacement

M1-051

The position of a particle $x(t)$ as a function of time (t) is described by the equation: $x(t) = 2.0 + 3.0 t - t^3$, where x is in m and t is in s. What is the maximum positive position of the particle on the x axis?

- A) 5.0 m
- B) 2.0 m
- C) 3.0 m
- D) 1.0 m
- E) 4.0 m

Answer E

2-2 Average Velocity and Average Speed

M1-052

Two cars are 150 km apart and traveling toward each other. One car is moving at 60. km/h and the other is moving at 40. km/h. In how many hours will they meet?

- A) 1.5 h
- B) 2.0 h
- C) 1.9 h
- D) 2.5 h
- E) 1.2 h

Answer A

2-3 Instantaneous Velocity and Speed

M1-052

The coordinate of a particle in meters is given by $x(t) = 16t - 3.0t^3$, where the time t is in seconds. The particle is momentarily at rest at time=

- A) 9.3 s
- B) 1.3 s
- C) 5.3 s
- D) 7.3 s
- E) 0.75 s

Answer B

2-3 Instantaneous Velocity and Speed

M1-051

A helicopter at height h (m) from the surface of the sea is descending at a **CONSTANT SPEED** v (m/s). The time it takes to reach the surface of the sea can be found from:

A) $-h = \frac{1}{2} g t^2$

B) $h = \frac{1}{2} g t^2$

C) $-h = -v t$

D) $h = v t - \frac{1}{2} g t^2$

E) $-h = -v t - \frac{1}{2} g t^2$

Answer C

2-4 Acceleration

M1-062

The velocity as a function of time for a particle moving along the x -axis is shown in Fig.1. The motion clearly has two different parts: the first part is from $t = 0$ to $t = 2.0$ s, and the second part is from $t = 2.0$ s to $t = 6.0$ s. Which one of the following statements is correct?

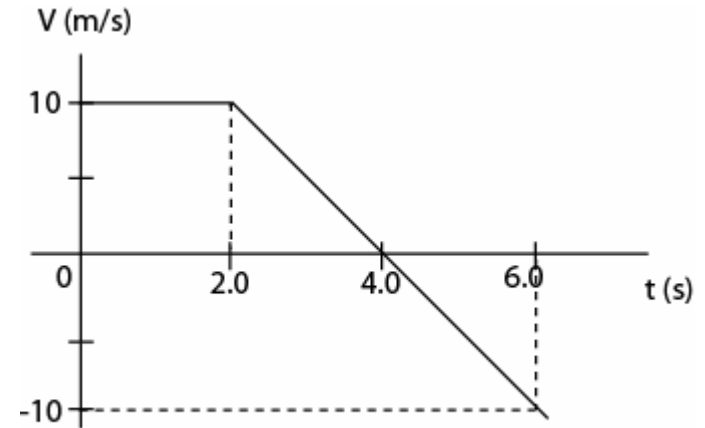


Figure 1

- A) From $t = 0$ to $t = 6.0$ s, the displacement is -20 m
- B) At $t = 4.0$ s the acceleration is zero
- C) From $t = 0$ to $t = 6.0$ s, the displacement is zero
- D) At $t = 4.0$ s the acceleration is -5.0 m/s^2
- E) At $t = 1.0$ s the acceleration is 10 m/s^2

Answer D

2-4 Acceleration

M1-062

A particle moves along the x axis. Its position is given by the equation $x = 2.0 + 3.0t - t^3$ with x in meters and t in seconds. The average acceleration from $t = 0$ to $t = 2.0$ s is:

- A) -6.0 m/s^2
- B) 3.0 m/s^2
- C) -2.0 m/s^2
- D) 4.0 m/s^2
- E) -5.0 m/s^2

Answer A

2-4 Acceleration

M1-061

The coordinate of a particle in meters is given by

$$x = 2.0t - 2.0t^2 ,$$

where the time t is in seconds. The particle is momentarily at rest at time t equal to:

- A) 0.50 s
- B) 0.75 s
- C) 2.0 s
- D) 1.3 s
- E) 4.0 s

Answer A

2-5 Constant Acceleration

M1-062

A car travels along a straight line at a constant velocity of 18 m/s for 2.0 s and then accelerate at -6.0 m/s^2 for a period of 3.0 s. The average velocity of the car during the whole 5.0 s is:

- A) 17 m/s
- B) 18 m/s
- C) 13 m/s
- D) 16 m/s
- E) 10 m/s

Answer C

2-5 Constant Acceleration

M1-061

At a traffic light, a truck traveling at 10 m/s passes a car as it starts from rest. The truck travels at a constant velocity and the car accelerates at 4.0 m/s^2 . How much time does the car take to catch up with the truck?

- A) 15 s
- B) 2.0 s
- C) 5.0 s
- D) 20 s
- E) 25 s

Answer C

2-5 Constant Acceleration

M1-052

An object starts from rest at the origin and moves along the x axis with a constant acceleration of 4 m/s^2 . Its average velocity as it goes from $x = 2 \text{ m}$ to $x = 18 \text{ m}$ is:

- A) 2 m/s
- B) 1 m/s
- C) 6 m/s
- D) 5 m/s
- E) 8 m/s

Answer E

2-6 Free-Fall Acceleration

M1-062

An arrow is shot straight up with an initial speed of 98 m/s. If friction is neglected, how high the arrow can reach?

- A) 98 m
- B) 980 m
- C) 250 m
- D) 490 m
- E) 150 m

Answer D

2-6 Free-Fall Acceleration

M1-061

A stone is thrown vertically downward from the top of a 40 m tall building with an initial speed of 1.0 m/s. After 2.0 s the stone will have traveled a distance of

- A) 15 m
- B) 38 m
- C) 40 m
- D) 25 m
- E) 22 m

Answer E

2-6 Free-Fall Acceleration

M1-052

A stone and a ball are thrown vertically upward with different initial speeds: 20 m/s for the stone and 10 m/s for the ball. If the maximum height reached by the ball is H then the maximum height reached by the stone is:

- A) $2 H$
- B) $4 H$
- C) H
- D) $H/2$
- E) $H/4$

Answer B

2-6 Free-Fall Acceleration

M1-051

A stone is thrown vertically downward from a building with an initial speed of 2.0 m/s . It reaches the ground after 5.0 s .

What is the height of the building?

- A) 130 m
- B) 60 m
- C) 180 m
- D) 120 m
- E) 140 m

Answer A

2-7 Graphical Analysis

M1-061

A particle starts from the origin at $t = 0$ and moves along the positive x-axis. A graph of the velocity of the particle as a function of time is shown in Fig 1. The average velocity of the particle between $t = 0.0$ s and 5.0 s is:

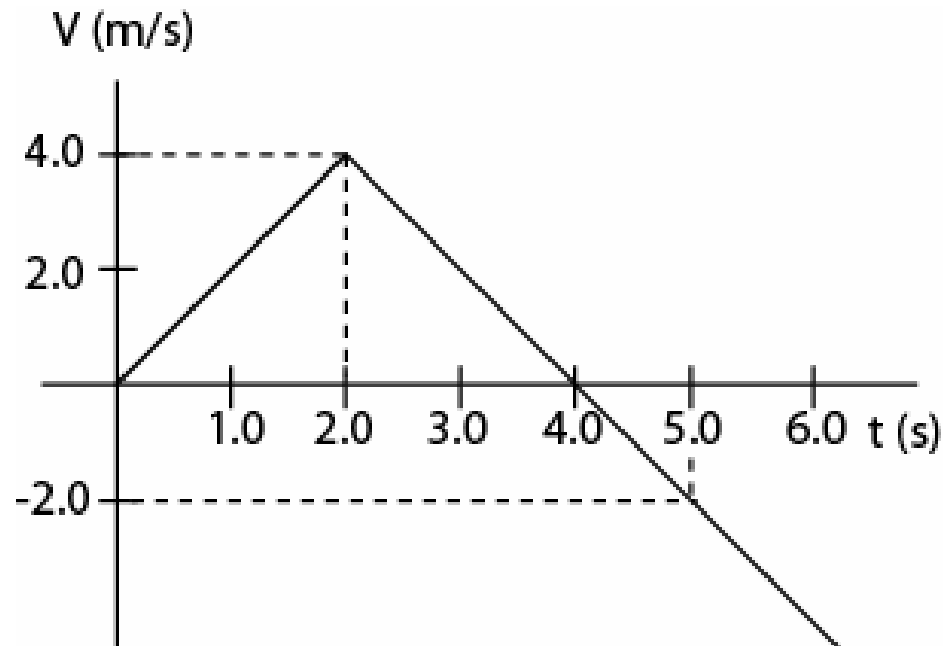


Figure 1

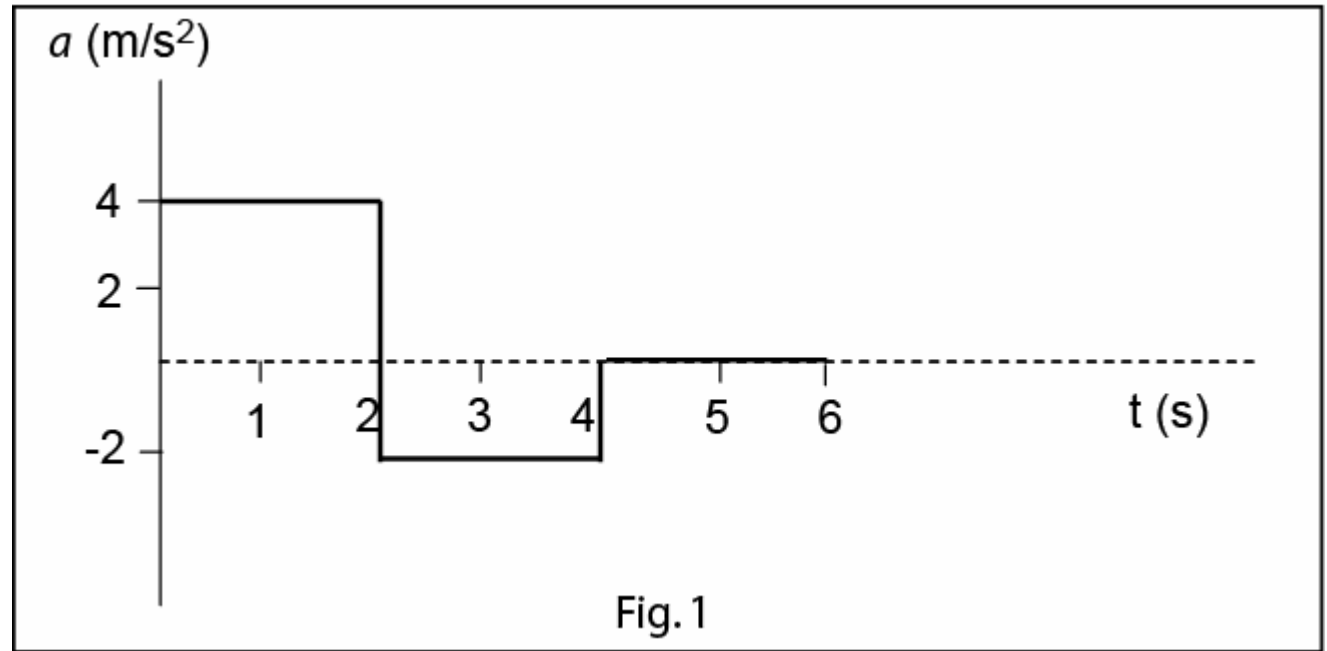
- A) 0 m/s
- B) 1.0 m/s
- C) -2.0 m/s
- D) 3.5 m/s
- E) 1.4 m/s

Answer E

2-7 Graphical Analysis

M1-051

A particle starts from rest at $t = 0$ s. Its acceleration as a function of time is shown in Fig. 1. What is its speed at the end of the 6.0 s?



- A) 0 m/s
- B) 4.0 m/s
- C) 12 m/s
- D) 2.0 m/s
- E) -12 m/s

Answer B