2-1A. A person walks 2 miles East (E) in 40 minutes and then back 1 mile West (W) in 20 minutes. What are her average speed and average velocity (**in that order)** in miles/hr (mph)?
(a) 1 mph; 3 mph E (b) 3 mph; 1 mph W (c) 3 mph; 1 mph E (d) 4 mph; 1 mph E (e) 3 mph; 0 mph E

2-2A. Which one of the following statements is wrong? Neglect air resistance.
(a) When a ball thrown vertically up is still rising, its velocity and acceleration are in opposite directions.
(b) An object can be increasing in speed as its acceleration decreases in magnitude.
(c) A ball is dropped straight down from a tower and simultaneously an identical ball is thrown horizontally from the same place with speed = 2 m/s. The second ball should hit the ground first.
(d) In a 2 lap qualifying heat on a circular track, a racing car covers the first lap at an average speed of 100 mi/hr. It is then impossible for the car to average 205 mi/hr for the entire 2 lap heat.
(e) When a ball thrown vertically up is later falling, its velocity and acceleration are in the same direction.

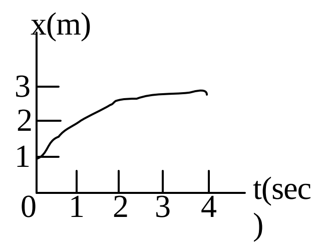
2-3A. A ball is thrown straight up into the air by a person standing on the ground. Consider three separate times: (A) while it is still on its way UP (↑); (B) when it is at the TOP of its flight; and (C) while it is on the way DOWN (↓). Which one of the following sets of arrows correctly describes the directions of velocity (v) and acceleration (a) at these three times as seen by the standing person?

(a)	(b)	(c)	(d)	(e)
(A) v↑, a↑	(A) v↑, a↓	(A) v↑, a↓	(A) v↑, a↑	(A) v↑, a↓
(B) v = 0, a↓	(B) v = 0, a = 0	(B) v = 0, a↓	(B) v = 0, a↓	(B) v = 0, a↓
(C) v↑ , a↓	(C) v↓, a↓	(C) v↑, a↓	(C) v↓, a↓	(C) v↓, a↓

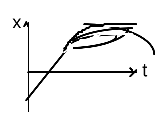
2-4A. Which one of the following statements is WRONG?
(a) At the top of the flight of a ball thrown vertically upward, its velocity is zero.
(b) An object's velocity can pass through zero while the object is accelerating.
(c) The velocity of an object can reverse direction while its acceleration is constant.
(d) An object can have a constant velocity and still have a varying speed.
(e) It would be unreasonable to neglect air resistance in analysing the fall of a feather.

2-5A. What are your average speed and average velocity (in that order) for the whole trip if you go from x = 5 m to x = 20 m in 4 sec and then from x = 20 m to x = 17 m in 2 sec? Take positive x as +.
(a) 3 m/s, +2 m/s (b) 2 m/s, + 3m/s (c) 2 m/s, +2 m/s (d) 3 m/s, - 2 m/s (e) None of these is close.

2-6A. The figure at the right shows x(t), the position as a function of time, t, of a particle moving along the x-axis. What is the average velocity of this particle for the time period 0 to 4 sec?
(a) + 2 m/s (b) + 0.5 m/s (c) + 0.75 m/s (d) + 1 m/s
(e) You can only calculate it if x(t) is a straight line.

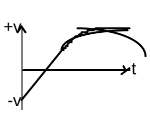


2-7A. An object is dropped from rest. Neglect air resistance. If it falls a distance s_1 during the <u>first</u> second, how far is s_2, the distance it falls during the <u>second</u> second? That is, the ratio s_2/s_1 =:
(a) 1 (b) 2 (c) 4 (d) 3 (e) 8

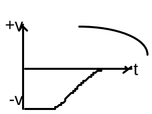


2-8A. The figure at the right shows the position as a function of time of a particle moving in a straight line. Which one of the following graphs best describes its velocity as a function of time?

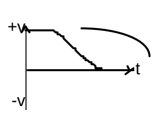
(a)



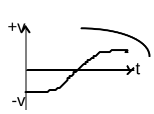
(b)



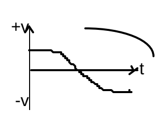
(c)



(d)



(e)



2-9A. About how far does your car, moving at 100 km/hr, travel forward during the 1 sec. of time that you take to look at a roadside accident?
(a) 100 km (b) 100 m (c) 28 m (d) 56 m (e) None of these is close.

2-10A. An airplane touches down with a landing speed of 220 km/hr and takes 9 sec to stop. If it stops with constant acceleration, about how far in meters does it travel during those 9 sec?
(a) 550 m (b) 55 m (c) 1980 m (d) 275 m (e) You don't have enough information to tell.

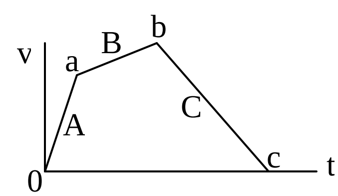
2-11A. Neglecting air resistance, and taking $g = 10\ m/s^2$, a stone dropped from rest off a 45 m tall building would hit the ground in about how many seconds?
(a) 0.5 sec. (b) 4.5 sec (c) 9.5 sec (d) 3 sec (e) None of these.

2-12A. A car traveling with initial speed 'v', comes to a stop in time 't', having covered distance d. The deceleration 'a' during time t is constant. Which of the following statements is correct?
(a) $d = vt/2$ (b) $v(\text{average}) = v/t$ (c) $a = -v/2t$. (d) $d = (vt^2)/2$ (e) None of these is correct.

2-13A. A ball is thrown upward with initial speed v = 20 m/s. How high does it rise? And how long does it take to reach its maximum height? Assume its acceleration has magnitude $10\ m/s^2$.
(a) 10m, 2 sec (b) 20 m, 1 sec (c) 20m, 2 sec (d) 10 m, 1 sec (e) None of these is correct.

2-14A. Two cars A and B are traveling at speeds v_A and v_B, respectively, directly toward each other. At t = 0 they are 2 km apart. The time when they pass each other is proportional to:
(a) $1/(v_A - v_B)$ (b) $v_A + v_B$ (c) $v_B - v_A$ (d) $1/(v_A + v_B)$ (e) $v_A - v_B$

2-15A. The figure at the right shows the velocity v as a function of time t for a particle moving along the x-axis. On which segment A, B, or C, is the magnitude of its acceleration largest, and on which segment (if any) is its acceleration negative?
(a) A, A (b) B, B (c) C, C (d) B, A (e) A,C



2-1B. A person walks 1 mile East (E) in 20 minutes and then runs back the 1 mile West (W) in 10 minutes. What are her average speed and average velocity (**in that order)** in miles/hr (mph)?
(a) 4 mph; 0 mph E (b) 3 mph; 4 mph E (c) 0 mph; 4 mph E (d) 4 mph; 1 mph E (e) 3 mph; 0 mph E

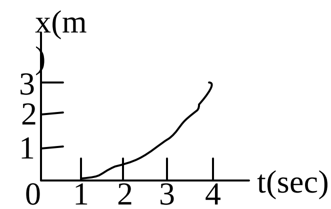
2-2B. Which one of the following statements is wrong? Neglect air resistance.
(a) When a ball thrown vertically up is still rising, its velocity and acceleration are in opposite directions.
(b) An object can be decreasing in speed as its acceleration decreases in magnitude.
(c) A ball is dropped straight down from a tower and simultaneously an identical ball is thrown horizontally from the same place with speed = 2 m/s. Both balls should hit the ground at the same time.
(d) In a 2 lap qualifying heat for a race on a circular track, a racing car covers the first lap at an average speed of 100 mi/hr. The car can still average 205 mi/hr for the 2 lap heat.
(e) While a ball thrown vertically upward is falling, its velocity and acceleration are in the same direction.

2-3B. A ball is thrown vertically upward, reaches its highest point, and falls back down. Which one of the following is true about its velocity **v** and its acceleration **a** during its trip?
(a) When it moves up, **v** is up and **a** is up. (b) When it moves up, **v** is up and **a** is down. (c) When it moves up, **v** is down and **a** is up.
(d) When it moves down, **v** is up and **a is** down. (e) When it moves down **v** is down and **a** is up.

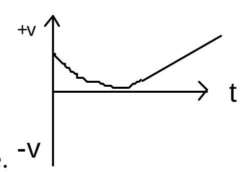
2-4B. Which one of the following statements is WRONG?
(a) At the top of the flight of a ball thrown vertically upward, its velocity is directed downward.
(b) An object's velocity can pass through zero while the object is accelerating.
(c) The velocity of an object can reverse direction while its acceleration is constant.
(d) If an object's speed is varying, its velocity must be varying.
(e) It would be unreasonable to neglect air resistance in analysing the fall of a feather.

2-5B. What are your average speed and average velocity (in that order) for the whole trip if you go from x = 5 m to x = 10 m in 3 sec and then from x = 10 m to x = -5 m in 2 sec? Take positive x as +.
(a) 2 m/s, - 2m/s (b) 4 m/s, -2 m/s (c) 4 m/s, + 2 m/s (d) 4 m/s, + 2 m/s (e) None of these is close.

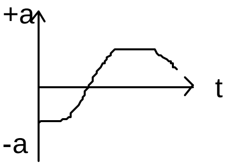
2-6B. The figure at the right shows x(t), the position as a function of time, t, of a particle moving along the x-axis. What is the average velocity of this particle for the time period 1 to 4 sec?
(a) + 1.3 m/s (b) + 0.5 m/s (c) + 0.75 m/s (d) + 1 m/s
(e) You can only calculate it if x(t) is a straight line.

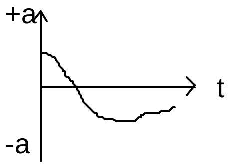


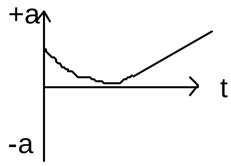
2-7B. An object is dropped from rest. Neglect air resistance. If it falls a distance s_1 during the <u>first</u> second, how far is s_3, the distance it falls during the <u>third</u> second? That is, the ratio s_3/s_1 =:
(a) 1 (b) 2 (c) 3 (d) 6 (e) 5

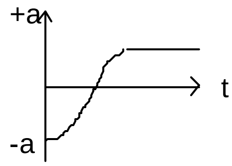


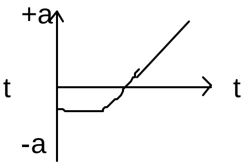
2-8B. The figure at the right shows the velocity of a car as a function of time. Which one of the following graphs most closely describes its acceleration as a function of time?

(a)


(b)


(c)


(d)


(e)


2-9B. About how far does your car, moving at 70 mi/hr, travel forward during the 2 sec. of time that you might take to look at a roadside accident?

(a) 140 ft (b) 35 ft (c) 102 ft (d) 205 ft (e) None of these is close.

2-10B. A drag racer accelerates with constant acceleration from 0 to 100 km/hr in 6 sec. About how far does she travel during the 6 sec.?

(a) 300 km (b) 83 m (c) 300 m (d) 167 km (e) You don't have enough information to tell

2-11B. Neglecting air resistance, a stone thrown horizontally at a speed of v = 30 m/sec from the top of an 80 m tall building would hit the ground after how many seconds? Take $g = 10\ m/s^2$.

(a) 4 sec (b) 3 sec (c) 8 sec (c) 8/3 sec. (d) Not enough information to tell.

2-12B. A car traveling with initial speed 'v', comes to a stop in time 't', having covered distance d. The deceleration 'a' during time t is constant. Which one of the following statements is correct?

(a) $a = -v/2t$ (b) $d = (vt^2)/2$ (c) $d = vt$ (d) $v(\text{average}) = v/2t$ (e) None of these is correct.

2-13B. A ball is thrown upward with initial speed v = 40 m/s. How high does it rise? And how long does it take to reach its maximum height? Assume its acceleration has magnitude $10\ m/s^2$.

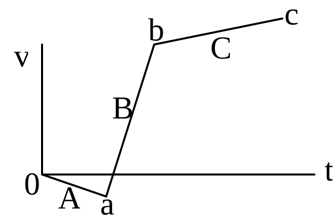
(a) 40m, 4 sec (b) 40 m, 2 sec (c) 80m, 8 sec (d) 80 m, 4 sec (e) None of these is correct.

2-14B. Two cars A and B are traveling at speeds v_A and v_B, respectively, directly away from each other. At t = 0 they are 2 km apart. The time when they pass each other is proportional to:

(a) $1/(v_A - v_B)$ (b) $v_A + v_B$ (c) $v_B - v_A$ (d) $1/(v_A + v_B)$ (e) $v_B - v_A$

2-15B. The figure at the right shows the velocity v as a function of time t for a particle moving along the x-axis. On which segment A, B, or C, is its acceleration negative, and at which point a,b, or c, is it furthest from the origin?

(a) A, a (b) B, b (c) C, c (d) A, c (e) C, b



2-1A) c 2A) c 3A) e 4A) d 5A) a 6A) b 7A) d 8A) c 9A) c 10A) d 11A) d 12A) a 13A) c 14A) d 15A) e

2-1B) a 2B) d 3B) b 4B) a 5B) b 6B) d 7B) e 8B) d 9B) d 10B) b 11B) a 12B) e 13B) d 14B) d 15B) d